DOCUMENT RESUME

ED 313 820 EC 212 285

AUTHOR	Enders, Alexandra, Ed.
TITLE	Technology for Independent Living: Sourcebook.
INSTITUTION	RESNA: Association for the Advancement of Rehabilitation Technology, Washington, DC.; Wisconsin Univ., Madison. Trace Center.
SPONS AGENCY	National Inst. of Handicapped Research (ED), Washington, D.C.
REPORT NO	ISBN-0-932101-08-9
PUB DATE	May 84
GRANT	G008300045
NOTE	286p.; Prepared by Tools for Living in the Community (TLC), Berkeley, California.
AVAILABLE FROM	RESNA, Department 4813, Washington, DC 20061-4813 ($25.00).
PUB TYPE	Guides - Non-Classroom Use (055) -- Reference Materials - Directories/Catalogs (132)
EDRS PRICE	MF01/PC12 Plus Postage.
DESCRIPTORS	*Assistive Devices (for Disabled); Communication Aids (for Disabled); Electronic Control; Elementary Secondary Education; *Engineering Technology; Financial Support; *Independent Living; Information Services; Microcomputers; *Normalization (Handicapped); *Physical Disabilities; Physical Mobility; Recreational Activities; *Rehabilitation; Sensory Aids; Vocational Rehabilitation

ABSTRACT

This sourcebook provides information for the practical implementation of independent living technology in the everyday rehabilitation process. "Information Services and Resources" lists databases, clearinghouses, networks, research and development programs, toll-free telephone numbers, consumer protection caveats, selected publications, and technology resources related to specific disabilities or age groups. "The Equipment Selection Process" addresses the importance of systematic selection procedures and provides guidelines for the initial client interview and an independent living skills checklist. "Technology at Home" offers advice on use of hospital beds at home, home management, personal care, clothing and shoes, architectural adaptations, and environmental control devices. "Educational and Vocational Technology" describes technical aids which may benefit disabled employees and students at all levels of education. "Recreational and Leisure Technology" focuses on wheelchair sports, water sports, winter sports, leisure activities such as gardening and fitness, and toys and games. "Technology for Personal Mobility" deals with seated wheeled systems, other types of mobility equipment such as walking aids and lifts, seating and positioning technology, and personal vehicles. Other sections include "Control, Communication and Sensory Aids," "Microcomputer Applications," and "Funding, Models, Policy, Statistics." (JDD)

ED313820

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

TECHNOLOGY
For INDEPENDENT LIVING
SOURCEBOOK

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Patricia Horner
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

INFORMATION SERVICES AND RESOURCES; THE EQUIPMENT SELECTION PROCESS; EDUCATIONAL AND VOCATIONAL TECHNOLOGY; RECREATIONAL & LEISURE TECHNOLOGY; TECHNOLOGY FOR PERSONAL MOBILITY; CONTROL, COMMUNICATION & SENSORY AIDS; MICROCOMPUTER APPLICATIONS; FUNDING, MODELS, POLICY, STATISTICS

EC 212215

RESNA

Association for the Advancement of Rehabilitation Technology

Alexandra Enders, O.T.R., Editor

2

BEST COPY AVAILABLE

Technology for Independent Living Sourcebook

Alexandra Enders, O.T.R.
Editor

Association for the Advancement of Rehabilitation Technology, Publishers
Suite 700, 1101 Connecticut Avenue, N.W., Washington, D.C. 20036
202/857-1199

TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK

Third Printing

Copyright 1984

by the

Association for the Advancement
of Rehabilitation Technology

ALL RIGHTS RESERVED

This book may not be reproduced in any form without the permission of the publisher. Individual pages may be reproduced with proper acknowledgment (except where taken from another source which should be consulted).

RESNA, Suite 700
1101 Connecticut Avenue, N.W.
Washington, D.C. 20036
202/857-1199

Printed in the
United States of America

ISBN 0-932101-08-9

FOREWORD

A primary mission of the Education and Publication Committees of RESNA is to promote the development of quality educational courses and materials for the membership. Our efforts in the past, as with most new ventures, have been limited mostly to individuals presenting their own research or clinical experiences. Unfortunately, this does little to draw on the experiences of others with the goal towards compiling a more objective knowledge base within a specific clinical area, that then can be used by others as a valuable information source for problem-solving.

This publication represents the second effort by the Education and Publication Committees to compile our current knowledge base and related information sources in the area of technology for independent living. The first was the **Technology for Independent Living Resource Guide** published last year. The **Sourcebook** continues and updates these materials, adding sections on control, communication and microcomputer applications. It also extends the scope of the original Guide by adding material to help consumers, practitioners and developers gain a better perspective on the many and individual fields covered, as well as some understanding of the priorities for intervention or action within them.

The original Resource Guide, and now the Sourcebook, reflect a trend in RESNA from simply reporting on technology, toward the development and presentation of materials and information on the practical implementation and application of technology in the everyday rehabilitation process. This increasing orientation in RESNA toward more service delivery and community-based information is a result of the growing number of rehabilitation practitioners within RESNA who both seek and provide us with this information.

We are indebted to Alexandra Enders for setting the pace in this direction -- as well as for the tremendous effort put forth in compiling, revising and extending this Sourcebook.

A special thanks is also given to Maurice LeBlanc who provided the support for the initial Resource Guide on which this book is based and to Christine Thompson, who, under very tight timelines, typed and proofed the Sourcebook for publication.

Gregg C. Vanderheiden
Chairman, Publications Committee
May, 1984

If you have or know of information which you believe should be in the next edition of the Sourcebook, please forward the information to RESNA's office, attention: Sourcebook Editor. If you are willing to assist the Editor in compiling the information for a section (existing or new) of the next edition, please contact either the RESNA office or the Publication committee chairperson. The quality, accuracy and comprehensiveness of the Sourcebook is dependent upon participation by consumers and professionals from each of the fields covered.

This Book was prepared for RESNA
by the staff of
Tools for Living in the Community (TLC)
Berkeley, California
with production support from the
Trace Research and Development Center
Waisman Center, University of Wisconsin-Madison
under its Grant No. G008300045 from the
National Institute of Handicapped Research
U.S. Department of Education

ACKNOWLEDGEMENTS

This sourcebook is based on an earlier Resource Guide, which was compiled in conjunction with a RESNA-sponsored instructional course: Technology for Independent Living, Houston, 1982. Material for the Resource Guide was contributed by the entire faculty: Lars Augustsson, Peter Axelson, Judy Bernett, Kathy Bowman, Will Clark, Alexandra Enders, Lex Frieden, Debbie Gilden, Marian Hall, John Leslie, Bob Kafka, Sam McFarland, Barry Romich, Jim Tobias, Elaine Trefler, and Margaret Young. The document was compiled and edited at the Rehabilitation Engineering Center at Children's Hospital at Stanford.

The need to expand and update the Resource Guide became obvious, and many members of RESNA helped make this second edition happen. David Jaffee, from the Palo Alto VA Rehabilitation R&D Center, had the original data files translated so they would work on the Trace Center's computers. Chris Thompson, of the Trace Center's staff, did all the typing, retyping, and arrangement -- a mammoth job -- in record time. Without her, this book would not have been produced.

Special thanks also go to Kathy Bowman, Project Threshold, Rancho Los Amigos Hospital; Jim Tobias, Rehabilitation Engineering Volunteer (REV) Network, New York; Rick Holte, Rehabilitation Engineering Center, Children's Hospital at Stanford; and John Brabyn, Smith-Kettlewell Rehabilitation Engineering Center, San Francisco, who all contributed new or greatly revised sections. Marian Hall, ABLEDATA system manager, added new information to the Information Section as well as providing up-to-date lists of manufacturers for several sections.

The staff of the Trace Center, University of Wisconsin-Madison, made this book a reality. Besides physically making it appear on paper, the Trace staff added substantially to the new sections on Microcomputer Applications, and Communication, Control and Sensory Aids. Mary Brady, Dale Bengston, and Francisco Villarruel all provided information. Gregg Vanderheiden not only contributed several articles, but also helped with the overall organization of the book, and the typesetting.

Each section of the Sourcebook was compiled from many sources including:

Information Resources

"Things that Help the Handicapped Help Themselves." Changing Times Magazine, November 1983. Kiplinger Magazine, 1729 H Street NW, Washington DC 200006.

Technology and the Handicapped. Office of Technology Assessment, US Congress, Washington, DC.

"Buyer Beware -- Shopping for Assistive Devices." Sensory Aids Technology Update. Sensory Aids Foundation, 399 Sheridan, Palo Alto, CA.

"Warranties Can Save You Time and Money." J. Schmitt, in Accent on Living, Spring 1981. P.O. Box 700, Bloomington, IN.

Comfortably Yours Catalog. 52 West Hunter Ave., Maywood, NJ 07607.

Equipment Selection Process

Kathy Bowman, OTR. Project Threshold, Rancho Los Amigos Hospital, Downey, CA.

Technology at Home

"Hospital Beds Come Home." Helen Cioschi, RN, and Mary Pat Erdner, RN. RxHomeCare, May 1984. Barrington Publications, 825 Barrington Avenue, Los Angeles, CA 90049.

"Pressure Relief Characteristics of Six Therapeutic Mattress Surfaces." I. Herszkowicz et al. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering. RESNA, 4405 East-West Highway, Bethesda, MD.

Drawings reprinted from A Guide to Controls. Children's Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA.

Independence Through Environmental Control Systems. D. Symington. Canadian Rehabilitation Council for the Disabled, 1 Younge Street, Toronto, Ontario, Canada.

A Know-How Manual on Electricity for the Severely Disabled and Their Families. A. Auchincloss and M. Youdin. Institute of Rehabilitation Medicine, New York University Medical Center, New York, NY.

Jim Tobias. Rehabilitation Engineering Volunteer Network, 201 W. 85th Street #2E, New York, NY 10024.

"Consumer Alert." Judy Berke. The Coordinator Magazine, 11417 Vanowen Street, North Hollywood, CA 91605.

Educational and Vocational Technology

Assistive Devices for Handicapped Students: A Model and Guide for a Statewide Delivery System.

Assistive Devices for Handicapped Students: A Model and Guild for a Statewide Delivery System, 1980. National Association of State Directors of Special Education, 1201 16th Street NW #610E, Washington, DC 20036.

Joseph Stowitschek's Forward to "Technological Advances in Special Education." Exceptional Education Quarterly, Winter, 1984.

Project Teach. Memphis City Schools, Division of Special Education, 2597 Avery Avenue, Memphis, TN.

"A Resource Center and Database Providing Educational and Vocational Access to Technical Fields for Persons with Disabilities." Helen Woodall and Albert Cook. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering. RESNA, 4405 East-West Highway, Bethesda, MD.

Special Needs Education Material for Vocational and Industrial Education: Part I. Apparatus Plan Book. Part 2. Bibliography. Ken Brewelheide, Department of Agricultural and Industrial Education, Montana State University, Helena, MT.

Technology for Independent Living II. Virginia Stern & Martha Redden, editors. AAAS, 1776 Massachusetts Avenue NW, Washington, DC.

Sam McFarland. Southwest Research Institute. San Antonio, TX.

John Leslie. Rehabilitation Engineering Center, Cerebral Palsy Research Foundation of Kansas, Wichita, KS.

Designing for Functional Limitations. James Mueller. Job Development Laboratory, The George Washington University, Washington, DC.

Recreational and Leisure Technology

"Technology for Recreation." Technology for Independent Living II. Virginia Stern & Martha Redden, editors. AAAS, 1776 Massachusetts Avenue NW, Washington, DC.

"Sports for Disabled Individuals." Rehab Brief, January 26, 1981. NIHR, NARIC. 4407 Eighth Street NE, Washington DC 20017.

Manufacturers of Sports Wheelchairs. ABLEDATA System, NARIC, 4407 Eighth Street NE, Washington DC 20017.

Smith & Hawken Catalog for Gardeners. 25 Corte Madera, Mill Valley, CA 94941.

"The Value of Toys." Howard Shane. Communication Outlook, April 1981. Artificial Language Laboratory, Michigan State University, East Lansing, MI.

"Exceptional Equipment for Exceptional Children." Criteria for Selecting Play Equipment for Early Childhood Education. Rifton Equipment, Rifton, NY.

Prentke Romich Company Catalog. Shreve, OH.

"Making Toys for Handicapped Children." R. McCorkey and D. Jeffree. Human Horizons Series, Souvenir Press, Ltd. 43 Great Russell Street, London, England.

Technology for Personal Mobility

"Mobility Device Evaluation Guide." Helen Tsuda, et al. Children's Hospital at Stanford, Rehabilitation Engineering Center, Palo Alto, CA.

Drawing reprinted from Prentke Romich Catalog, Shreve, OH.

"Batteries on Powered Wheelchairs -- The Do's and Don'ts of Battery Care." David Bayer. Current Expressions, Vol. 1, No. 1. Newsletter of Prentke Romich Company, Shreve, OH.

Wheelchair Manufacturers. ABLEDATA System, NARIC, 4407 Eighth Street NE, Washington DC 20017.

"The Development of Wheelchair Standards." L. Phillips et al. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering. RESNA, 4405 East-West Highway, Bethesda, MD.

"Mobility Aids for the Blind." John Brabyn. Smith-Kettlewell Institute of Visual Sciences, 2232 Webster St., San Francisco, CA.

Paul Brand. Editorial in Journal of Rehabilitation R&D. Vol. 20, #1, July 1983. Office of Technology Transfer, VAPC, 752 Seventh Avenue, New York, NY.

Choosing the Best Wheelchair Cushion for Your Needs, Your Chair, and Your Lifestyle. Peggy Jay. Royal Association for Disability and Rehabilitation, 25 Mortimer Street, London, England.

"The Effectiveness of Preventive Management in Reducing the Occurrence of Pressure Sores." T. Krouskop et al. Journal of Rehabilitation R&D. Vol. 20, #1, July 1983. Office of Technology Transfer, VAPC, 752 Seventh Avenue, New York, NY.

"A Brief Guide to Postural Seating Technology." Richard Holte. Children's Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA.

Seating for Children with Cerebral Palsy: A Resource Manual. Elaine Trefler, editor. University of Tennesee Rehabilitation Engineering Program, 682 Court, Memphis, TN.

Douglas Hobson. University of Tennesee Rehabilitation Engineering Program, 682 Court, Memphis, TN.

"Side by Side Trials: An Evaluation Methodology for Comparative Testing of Modular Wheelchair Insert Systems." S. Schazlein, R. Holte. Proceedings of the Sixth Annual Conference On Rehabilitation Engineering. RESNA, 4405 East-West Highway, Bethesda, MD.

Rehab Brief. June 25, 1984. NIHR, NARIC, 4407 Eighth Street NE, Washington DC 20017.

"Hints on Operating a Successful Driver Education Program." Margaret Young, OTR. Ontario Crippled Children's Centre, 350 Rumsey Road, Toronto, Ontario, Canada.

Evaluation forms from Colorado Driving School, Englewood, CO.

Teaching Driver Education to the Physically Handicapped. Human Resources Center. Albertson, NY.

Hand Controls and Assistive Devices for the Physically Disabled Driver. Human Resources Center. Albertson, NY.

Control, Communication and Sensory Aids

A Guide to Controls. Children's Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA.

"Controller Characteristics." Prentke Romich Company, Shreve, OH.

"Switch Rules and Considerations for Communication Use." W. Tracy and D. Bevans. Communication Outlook, Winter 1984. Artificial Language Laboratory, Michigan State University, East Lansing, MI.

"Some Guidelines for Good Interfaces." High Technology Magazine, April 1980.

"What Kind of Communication Aids Are Available?" Trace R&D Center, 314 Waisman Center, 1500 Highland Avenue, Madison WI.

James Heller's book review of Communication Systems for Severely Handicapped Persons. In Rehabilitation Literature, November 1983.

Sensory Aids Technology Update. November 1983, December 1983. Sensory Aids Foundation, 399 Sheridan, Palo Alto, CA.

Microcomputer Applications

Personal Computers and the Disabled: A Resource Guide. Apple Computer, Inc., Cupertino, CA.

Comparison of Apple, Epson, IBM... Microcomputers for Applications in Rehabilitation Systems for Persons with Physical Handicaps. Trace R&D Center, 314 Waisman Center, 1500 Highland Avenue, Madison WI.

"Computer Shopping for the Blind Consumer." Sensory Aids Technology Update. Sensory Aids Foundation, 399 Sheridan, Palo Alto, CA.

Gregg Vanderheiden. Trace R&D Center, 314 Waisman Center, 1500 Highland Avenue, Madison WI.

"How Can I Use a Computer If I Can't Use Its Standard Keyboard?" Gregg Vanderheiden. Trace R&D Center, 314 Waisman Center, 1500 Highland Avenue, Madison WI.

Network News. Vol. 6, #3. Newsletter of the Technical Assistance and Dissemination Network: Illinois Special Needs Population, Turner Hall 205, Illinois State University, Normal, IL.

Generic Model of Comptuer Applications for the Handicapped (chart). Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide. G. Nave et al. International Council for Computers in Education, University of Oregon, Eugene, OR.

Funding, Models, Policy, Statistics

"High Tech/High Touch." Douglas Fenderson, Ph.D. Discovery '83: Computers for th Disabled. Materials Development Center, ut Vocational Rehabilitation Institute, Univers f Wisconsin-Stout, Menominee, WI.

"Public Service Community Development Block Grants." Communication Outlook, Winter 1984. Artificial Language Laboratory, Michigan State University, East Lansing, MI.

Project Teach. Memphis City Schools, Division of Special Education, 2597 Avery Avenue, Memphis TN.

Accomodation Can Be Reasonable: A Study of Accommodations Provided to Handicapped Employees by Federal Contractors. Department of Labor, Washington, DC.

Disability Management Today. Mueller & Zullo, In. 16 Hudson Street, New York, NY.

"Engineering Aids Reduce Barriers to Employment for Severely Handicapped Clients." Rehab Brief, Vol. 1 #8, August, 1978. NIHR, NARIC, 4407 8th Street NE, Washington DC 20017.

Project Threshold Annual Report 1982. Project Threshold, Rancho Los Amigos Hospital, Downey, CA.

"Provision of Assistive Equipment for Handicapped Persons." J. Kohn et al. Archives of Physical Medicine and Rehabilitation, Vol. 64, August 1983.

"How Much Is Your Disability Worth?" Accent on Living, Summer 1981. PO Box 700, Bloomington, IN.

"Implications of Cost Effectiveness Analysis of Medical Technology." Office of Technology Assessment, US Congress, Washington, DC.

Additionally, two sources were used throughout the text:

Easter Seals; bibliographies, brochures, and the reviews in its bimonthly publication, Rehabilitation Literature.

National Rehabilitation Information Center (NARIC); bibliographic sources and annotations.

TABLE OF CONTENTS

INTRODUCTION . . . 1

INFORMATION SERVICES AND RESOURCES: . . . 5

DATABASES, CLEARINGHOUSES, NETWORKS . . . 5

COMPUTERIZED DATA RETRIEVAL SYSTEMS FOR TECHNICAL AIDS . . . 5
ABLEDATA / HOW ABLE IS ABLEDATA? / BRS AFTER DARK . . . 5
ACCENT ON INFORMATION . . . 9
ASSISTIVE DEVICE DATABASE SYSTEM (ADDS) . . . 9
ERIC . . . 9
NARIC . . . 10
OTHER ON-LINE DATABASES . . . 10
WHERE HAVE ALL THE DEVICE DATABASES GONE? . . . 11
INFORMATION CLEARINGHOUSES . . . 12
TECHNOLOGY INFORMATION EXCHANGE NETWORKS . . . 14
CONFER . . . 14
HEX . . . 14
SPECIALNET . . . 14
INTERNATIONAL INFORMATION ON TECHNICAL AID INFORMATION SYSTEMS . . . 15

RESEARCH & DEVELOPMENT PROGRAMS ON TECHNICAL AIDS . . . 16

TOLL FREE NUMBERS . . . 21

CONSUMER PROTECTION . . . 26

SELECTED PUBLICATIONS AND OTHER RESOURCES . . . 27

PUBLICATIONS WHICH PROVIDE DISABILITY & TECHNOLOGY OVERVIEW . . . 27
DISABILITY BOOKS WHICH HAVE USEFUL INFORMATION ON DEVICES . . . 27
PRODUCT DIRECTORIES . . . 28
A DIFFERENT APPROACH TO ASSISTIVE DEVICES . . . 29
SOURCES OF CURRENT INFORMATION . . . 30
AUDIOVISUALS . . . 31
NATIONAL ORGANIZATIONS . . . 31

TECHNOLOGY RESOURCES RELATED TO SPECIFIC DISABILITIES OR AGE GROUPS . . . 32

ARTHRITIS . . . 32
CEREBRAL PALSY . . . 32
DISABLED CHILDREN . . . 32
DISABLED ELDERLY . . . 34
LARYNGECTOMY . . . 34
MULTIPLE SCLEROSIS . . . 34
ONE-HANDED . . . 34
OSTOMY . . . 35
PARKINSON'S DISEASE . . . 35
STROKE . . . 35

FOR INFORMATION SPECIALISTS . . . 35

THE EQUIPMENT SELECTION PROCESS . . . 39

EQUIPMENT SELECTION PROCESS . . . 39

EVALUATION FORMATS . . . 42

GUIDELINES FOR INITIAL CLIENT INTERVIEWS (PROJECT THRESHOLD) . . . 43
INDEPENDENT LIVING SKILLS CHECKLIST (CIL) . . . 47

SELECTED PUBLICATIONS . . . 53

DEVICE SELECTION, BASIC USE AND TRAINING . . . 53

TECHNOLOGY AT HOME 55

TECHNOLOGY AT HOME 55

INTRODUCTION 57
HOSPITAL BEDS AT HOME 57
HOME MANAGEMENT 60
PERSONAL CARE 62
CLOTHING & SHOES 62
ARCHITECTURAL ADAPTATIONS 63

MORE PUBLICATIONS ON AT-HOME TECHNOLOGY & TECHNIQUES 64

ENVIRONMENTAL CONTROLS AND OTHER ELECTRONIC DEVICES FOR THE HOME 66

EDUCATIONAL AND VOCATIONAL TECHNOLOGY 73

TECHNOLOGY IN THE CLASSROOM 75

INTRODUCTION 75
TECHNOLOGY SERVICE DELIVERY 75
PROJECT TEACH: A MODEL PROGRAM 75
ORGANIZATIONS 76
RESOURCE CENTER 77
EDUCATIONAL AIDS INFORMATION RESOURCES 78
MANUFACTURERS 78
ORGANIZATIONS 78
DATABASES 78
RESOURCES 79

VOCATIONAL EDUCATION 82

TECHNOLOGY AT THE WORKPLACE 85

INTRODUCTION 85
COSTS 85
WORKSTATION DESIGN 85
THREE CASE STUDIES 89
FARMING 90
A RESOURCE FOR DEVELOPING ACCESSIBLE JOBSITES 91
TECHNOLOGY FOR EMPLOYMENT: RESOURCES 91
ORGANIZATIONS 91
GROUPS CONCERNED WITH COMPUTER EMPLOYMENT 92
SELECTED PUBLICATIONS 99
PUBLICATIONS 99
PERIODICALS 101
CATALOGS AND DIRECTORIES 102

RECREATIONAL & LEISURE TECHNOLOGY 105

INTRODUCTION: TECHNOLOGY FOR RECREATION 105

SPORTS 109

DISABILITY-RELATED NATIONAL SPORTS ORGANIZATIONS 109
NATIONAL ORGANIZATIONS WITH INTEREST IN RECREATION FOR DISABLED PEOPLE 109

WHEELCHAIR SPORTS 111

SPORTS WHEELCHAIRS 111
BASKETBALL 112
FOOTBALL 112
MARATHON RACING 112
MOTORCYCLING 112
SOFTBALL 112
TENNIS 112

RECREATIONAL & LEISURE TECHNOLOGY, cont.

WATER SPORTS ... 113

BOATING ... 113
SCUBA ... 114
WATERSKIING ... 114

WINTER SPORTS ... 115

SKIING ... 115
SKATING ... 116

OTHER SPORTS ... 117

BOWLING ... 117
GOLF ... 117
FLYING ... 117
HUNTING & FISHING ... 117

ADDITIONAL PUBLICATIONS ... 118

AUDIOVISUALS ... 118

SOME LOCAL RECREATION PROGRAMS ... 119

LEISURE ACTIVITIES ... 122

GARDENING ... 122
MUSIC ... 122
NEEDLEWORK ... 123
FITNESS ... 124
TRAILS ... 124

TOYS AND GAMES ... 125

THE VALUE OF TOYS ... 125
CRITERIA FOR GOOD EQUIPMENT ... 125
CHOOSING THE RIGHT TOY ... 125
CONCEPT OF CONTROL ... 126
A NOTE ON SAFETY ... 126
DO IT YOURSELF ... 126
PEOPLE AND ORGANIZATIONS WITH A SPECIAL INTEREST IN TOYS AND GAMES ... 126
SOME MANUFACTURERS OF SPECIAL TOYS ... 127
TOY LIBRARIES ... 128
SELECTED PUBLICATIONS: TOYS & GAMES ... 130

PLAYGROUNDS ... 132

TECHNOLOGY FOR PERSONAL MOBILITY ... 135

MOBILITY DEVICES ... 135

SEATED WHEELED SYSTEMS ... 135
MOBILITY DEVICE EVALUATION GUIDE ... 135
WHEELCHAIR CONTROL SYSTEMS ... 145
BATTERIES FOR WHEELCHAIRS ... 146
INFORMATION RESOURCES ON WHEELCHAIRS ... 147
SOME COMMERCIAL SOURCES OF WHEELCHAIRS ... 149
R&D ORGANIZATIONS ... 152
WHEELCHAIR STANDARDS ... 152
MOBILITY -- BEYOND SEATED WHEELED SYSTEMS ... 153
CHOOSING & USING OTHER TYPES OF MOBILITY EQUIPMENT (WALKING AIDS, LIFTS, ETC.) ... 153
PROTECTIVE AIDS ... 153
MOBILITY FOR BLIND PEOPLE ... 154

TECHNOLOGY FOR PERSONAL MOBILITY, cont.

SEATING AND POSITIONING TECHNOLOGY ... 156

INTRODUCTION ... 156
THE FUNCTION OF A WHEELCHAIR CUSHION ... 156
PRESSURE RELIEF ... 157
POSTURAL SEATING ... 159
A BRIEF GUIDE TO POSTURAL SEATING TECHNOLOGY ... 159
SEATING SERVICE PROGRAMS ... 164
COMMERCIAL SOURCES ... 166
SIDE-BY-SIDE TRIALS ... 170
PUBLICATIONS ... 172
BIBLIOGRAPHY ... 173
AUDIOVISUALS ... 178

PERSONAL VEHICLES ... 179

INTRODUCTION ... 179
HINTS ON OPERATING A SUCCESSFUL DRIVER EDUCATION PROGRAM ... 179
ASSOCIATION OF DRIVER EDUCATORS FOR THE DISABLED ... 180
DRIVING EVALUATION FORMS ... 181
EQUIPMENT RECOMMENDATION FORM ... 185
CAR SELECTION AND PURCHASE ... 185
GUIDE TO THE USE OF HAND CONTROLS AND ASSISTIVE DEVICES ... 186
OTHER RESOURCES: PUBLICATIONS AND AUDIOVISUALS ... 187
RESEARCH & DEVELOPMENT ... 189

CONTROL, COMMUNICATION AND SENSORY AIDS ... 193

CONTROL ... 193

INTRODUCTION ... 193
CONTROLLER CHARACTERISTICS ... 194
GUIDELINES FOR SWITCHES ... 195
GUIDELINES FOR GOOD INTERFACES ... 195
INTERNATIONAL STANDARDIZED INTERCONNECTION PROJECT ... 196
SELECTED PUBLICATIONS: CONTROL AND ASSESSMENT ... 197
SOME MANUFACTURERS & DISTRIBUTORS OF CONTROLS ... 198
ALTERNATIVES TO PURCHASE: DO IT YOURSELF ... 201
R&D ORGANIZATIONS ... 202

COMMUNICATION ... 203

WHAT KINDS OF COMMUNICATION TECHNIQUES ARE AVAILABLE? ... 203
WRITING & TYPING ... 204
ISAAC ... 205
GUIDES TO COMMUNICATION AIDS ... 205
SELECTED PUBLICATIONS ... 206
AUDIOVISUALS ... 207
SERVICE CENTERS ... 208
NONSPEECH ADVOCACY ORGANIZATIONS ... 211
SOME COMMUNICATION AID MANUFACTURERS ... 213
RESEARCH & DEVELOPMENT ... 215

SENSORY AIDS ... 216

TECHNOLOGY FOR PEOPLE WITH IMPAIRED VISION ... 216
SELECTED PUBLICATIONS ... 216
PRODUCT CATALOGS ... 217
AUDIOVISUALS ... 217
OTHER RESOURCES ... 218

TECHNOLOGY FOR PEOPLE WITH IMPAIRED HEARING ... 219
EQUIPMENT DEMONSTRATION CENTERS ... 219
DEAFNET ... 219
SELECTED PUBLICATIONS ... 220
ORGANIZATIONS ... 222
TDDs ... 223

1 2

MICROCOMPUTER APPLICATIONS 227

INTRODUCTION 227

GENERAL GUIDELINES FOR SELECTING A COMPUTER 227

COMPUTER SHOPPING FOR THE BLIND CONSUMER 228

AN ISSUE OF ACCESS 230

COMPUTER-RELATED INFORMATION FROM TRACE CENTER 232

USING A COMPUTER WHEN YOU CAN'T USE ITS STANDARD KEYBOARD 233

SOURCES FOR MORE INFORMATION ON MICROCOMPUTER APPLICATIONS FOR DISABLED PEOPLE 236

PUBLICATIONS 236
CLEARINGHOUSES & CATALOGS 237
NEWSLETTERS 238
MASS MARKET COMPUTER MAGAZINES 238
CONFERENCE PROCEEDINGS 239
INFORMATION EXCHANGE NETWORKS 241
RESOURCES FOR SPECIAL APPLICATIONS 243
IN SPECIAL EDUCATION 243
IN COGNITIVE REHABILITATION 244
VOICE INPUT 245
VOICE OUTPUT 245
COMPUTER ACCESS FOR BLIND PEOPLE 246

SOFTWARE/HARDWARE REGISTRY FORMS 247

FUNDING, MODELS, POLICY, STATISTICS 251

FUNDING 251

A FUNDING RESOURCE NETWORK? 251
FUNDING FOR DEVICES 251
SOME IDEAS FOR REDUCING PRODUCT COSTS 252
USED EQUIPMENT 252
EQUIPMENT LOANS 253
TAX DEDUCTIONS 253
DO-IT-YOURSELF 253
SELECTED PUBLICATIONS ON FUNDING FOR DEVICES 254
A NOTE ON FUNDRAISING 256

SERVICE DELIVERY MODELS 257

EXAMPLES OF SERVICE DELIVERY MODELS 257
A MODEL PROGRAM FOR SERVICE DELIVERY 257
AN INFORMATION AND ASSISTANCE CENTER 257
A PROJECT IN THE SCHOOL SYSTEM 258
AN INSTITUTION-BASED ADAPTIVE AID SERVICE 259
SELECTED PUBLICATIONS: DELIVERY MODELS 260

PUBLIC POLICY AND TECHNOLOGY FOR DISABLED PEOPLE 261

SELECTED PUBLICATIONS 261

TECHNOLOGY COST/EFFECTIVENESS/BENEFIT 262

STATISTICAL INFORMATION RESOURCES 264

INTRODUCTION

We all use "technical aids." With the advance of technology, physical strength and ability have declined as the primary measure of worth and the only means to compete for survival. When we need to accomplish a task beyond our physical capabilities, a tool is developed to make that task possible or safer or faster or just easier and more convenient. One of the identifying features of the human species has been its skill at making and using tools. The story of humankind can readily be told as the history of the development of technological innovation.

Compared to the enormous power of machinery, all human beings are physically limited. At each point in history, society defines and redefines the criteria for physical and mental normalcy. Certain members are excluded from being able to independently maintain themselves based on these arbitrary limits. In cases where technology is able to acceptably compensate for the limitation, especially when a significant portion of the population has a similar disability, the limitation is redefined as being within normal limits, and those people are no longer stigmatized as being handicapped. Disability is a matter of degree. Technology can reduce the gap, as in the case of eyeglasses. Not even airline personnel are discriminated against any longer for wearing corrective lenses. Lower back problems seem to be headed into the "normal" range -- there is a store in Boston specializing in low back problems, and it is definitely not focusing its marketing strategy toward the "disability" market; its target is the "normal" person with a back problem. Hearing aids also appear to be heading out of the "adaptive aid" category, even the U.S. President now openly wears one, and the advertising campaigns for hearing aids are increasingly emphasizing convenience, happiness, and quality of life.

The last ten years have been exciting times in the field of applied technology for disabled people. From a time when there were very few devices, we now have a situation where there are more devices than anyone can keep track of without the help of a computer. R&D efforts have increased; service delivery is beginning to change from an art to a science, and we can begin to exchange ideas about how and why we have succeeded and failed.

Along with the many new devices that are now on the market or under development, there has come an explosion of information about technical aids for disabled people. If you are an information specialist, you may find yourself inundated with it. If you are a practitioner or a consumer, you may know it's out there, but not know quite where to find it. This Sourcebook was written to help make some sense out of the sometimes bewildering array of information available on technical aids for disabled people.

The emphasis throughout is on practical applications of technology. Many sources have been quoted, to give you an idea of the resources that you have available to you.

Organizations and people have been listed who may be able to help find answers for your questions. Publications are listed as sources of more information. A few of the publications are out of print, but have been included because they are classics, still useful, and nothing better exists to supercede them. They can generally be found in therapy departments or rehabilitation medicine units.

There is one major resource that has not been specifically referred to in this guide. As a group, this resource is often overlooked, even though their information is usually the most effective, least expensive, and has stood the test of time: disabled consumers. Find them, ask them questions, listen to them. Trade information! Mrs. B. may want to know about shower benches, but she probably has a wealth of information about kitchens. This information has proven its reliability and validity. Take advantage of it whenever possible.

A listing of local community resources was beyond the scope of this book. If you don't know where else to start looking, try the yellow pages of the phone directory. These are some suggested headings: crutches, wheelchairs, wheelchair lifts and ramps, van conversions, hearing aids, handicapped equipment, physical therapy equipment, physician's & surgeon's equipment and supplies, surgical appliances and supplies, rehabilitation services, home health services, handicapped assistance,handicapped transportation services, human services organizations, social service organizations, rental service stores, associations. Your directory may have others.

This resource guide is not intended to convey everything you always needed to know about technology for disabled people. It is, however, a good place to start if you are looking for practical information. Good luck!

alexandra Enders

A NOTE ON MYSTIFICATION: Avoiding Hardware Inferiority Complexes (HIC)

Often nontechnologists look at the designer-technician as a wizard. It is important to deflate this myth. Everyone has excellent ideas for devices, but these ideas might never see the light of day, due to a hardware inferiority complex (HIC). Designs at the grassroots level, by the way, have HICs with respect to the even more wizard-like R&D programs!

If the idea is to provide functional services, then we must give up this socially enforced tendency to worship equipment and refocus on people. Here are some phrases to repeat before a mirror.

If you are not a technologist: "I don't care if it is 'state-of-the-art!'" "No, I'm not dumb; you just have to learn to express yourself so we can understand you." "Microprocessor, shmicro-processor!"

If you are a technologist: "Sixty seconds of silence." (You may have to work up to this.) "That sounds like a good idea. Can I explain how we might be able to build it?" "Gee, I didn't know that."

Jim Tobias
"Grassroots Rehabilitation Technology and the Delivery System"
AAAS Workshop, Houston, Texas
December 4-5, 1980

A NOTE ON TECHNOPHILIA

The danger exists that technology will be viewed as an end in itself, not as a means to an end. Technology produces two groups of people -- those who love it (technophiles) and those who don't (technophobes). Some people have a low "gadget tolerance," and don't feel comfortable around sophisticated assistive devices. Questions about gadget tolerance must be asked of the provider, the consumer, and the caregiver. Devices obviously shouldn't be pushed on someone who doesn't like them; they'll end up in the closet. But there is another danger here, that of the "technophile," the person with a high gadget tolerance. Sometimes devices are requested because they are new, innovative, "glittery," not because they are best suited to the individual. Please note that when questioning the degree of gadget tolerance, the provider who is asking the question should do some self-examination at that point, and also look at the motivation of other team members who are recommending devices.

Alexandra Enders
"Questionable Devices"
Special Sessions
Second International Conference on Rehabilitation Engineering
Ottawa, Ontario, Canada
June, 1984

17

Information Resources

INFORMATION SERVICES AND RESOURCES: 5

DATABASES, CLEARINGHOUSES, NETWORKS 5

COMPUTERIZED DATA RETRIEVAL SYSTEMS FOR TECHNICAL AIDS 5
ABLEDATA / HOW ABLE IS ABLEDATA? / BRS AFTER DARK 5
ACCENT ON INFORMATION 9
ASSISTIVE DEVICE DATABASE SYSTEM (ADDS) 9
ERIC 9
NARIC 10
OTHER ON-LINE DATABASES 10
WHERE HAVE ALL THE DEVICE DATABASES GONE? 11
INFORMATION CLEARINGHOUSES 12
TECHNOLOGY INFORMATION EXCHANGE NETWORKS 14
CONFER 14
HEX 14
SPECIALNET 14
INTERNATIONAL INFORMATION ON TECHNICAL AID INFORMATION SYSTEMS 15

RESEARCH & DEVELOPMENT PROGRAMS ON TECHNICAL AIDS 16

TOLL FREE NUMBERS 21

CONSUMER PROTECTION 26

SELECTED PUBLICATIONS AND OTHER RESOURCES 27

PUBLICATIONS WHICH PROVIDE DISABILITY & TECHNOLOGY OVERVIEW 27
DISABILITY BOOKS WHICH HAVE USEFUL INFORMATION ON DEVICES 27
PRODUCT DIRECTORIES 28
A DIFFERENT APPROACH TO ASSISTIVE DEVICES 29
SOURCES OF CURRENT INFORMATION 30
AUDIOVISUALS 31
NATIONAL ORGANIZATIONS 31

TECHNOLOGY RESOURCES RELATED TO SPECIFIC DISABILITIES OR AGE GROUPS 32

ARTHRITIS 32
CEREBRAL PALSY 32
DISABLED CHILDREN 32
DISABLED ELDERLY 34
LARYNGECTOMY 34
MULTIPLE SCLEROSIS 34
ONE-HANDED 34
OSTOMY 35
PARKINSON'S DISEASE 35
STROKE 35

FOR INFORMATION SPECIALISTS 35

DATABASES, CLEARINGHOUSES, NETWORKS

COMPUTERIZED DATA RETRIEVAL SYSTEMS FOR TECHNICAL AIDS

WHAT IS A COMPUTERIZED DATABASE?

A computerized database is a body of information stored in a computer. The information gets into the computer via devices such as word processors or computerized typesetting machines which translate the words and sentences into the numbers which the computer can manipulate. Modern computers are large enough and fast enough to hold billions of words and read them all in seconds. A data search is what happens when the computer scans a database for the occurrence of specified words, resulting in the recovery of the desired information.

THE ABLEDATA SYSTEM

The ABLEDATA System is a computerized data retrieval system for information on rehabilitation products, funded by the National Institute for Handicapped Research of the U.S. Department of Education and operated by the National Rehabilitation Information Center (NARIC). The ABLEDATA product database lists commercially available rehabilitation products. The national database lists only manufacturers, sole distributors or national distributors with unique mail-order product catalogs. Bibliographic materials and organization information are available through BRS on REHABDATA (NRIC), also maintained by NARIC. Using ABLEDATA can help people make more informed decisions about purchasing the appropriate aids or devices they require.

ABLEDATA can provide answers to questions like:

My uncle has impaired vision. What kinds of reading aids are available to help him?

My company is developing an Employee Assistance Plan. Is there a resource for equipment which could help those people injured on-the-job to return to work quickly?

Kelly had always enjoyed carpentry and I think it would be therapeutic to continue, but maneuvering standard tools is impossible. How can I find out what adaptive devices are available?

I manufacture fishing gear and have developed a fishing pole mount for wheelchairs. Is there a centralized place to list its availability?

My patient wants to stay out of a nursing home, but wonders about maintaining a daily routine alone. Are there devices which would help?

Pat will be going back to work shortly. I think a van would be a wise purchase at this point, but how can I get comparative information about van modifications to help Pat make an informed decision?

ABLEDATA lists over 10,000 products which are commercially available. Further, ABLEDATA is updated monthly, which means that the product listings are continually being expanded and refined to assure you of the most current product information.

Products listed in ABLEDATA extend from the simple to the sophisticated and reflect a broad range of equipment needs. Products are identified by the following categories:

- o Personal care
- o Vocational/Educational
- o Seating
- o Communication
- o Ambulation
- o Orthotics/Prosthetics
- o Home management
- o Mobility
- o Transportation
- o Recreation
- o Therapeutic Aids
- o Sensory Aids

WHAT DOES AN ABLEDATA PRODUCT LISTING INCLUDE?

Each ABLEDATA product listing includes the following descriptive information:

- o Common product name
- o Brand name
- o Manufacturer
- o Cost
- o Description of the product
- o Informal user comments (if available)
- o Abstracts of formal evaluations (if available)

HOW CAN A PRODUCT BE LISTED ON ABLEDATA?

ABLEDATA welcomes recommendations from product users, researchers, health professionals and manufacturers regarding equipment and devices to add to the database. In addition, the staff reviews journals and manufacturer catalogs as well as contacting individuals in the field of rehabilitation for new product ideas.

As an integral component with the actual database, the ABLEDATA System includes a network of Information Brokers. The Network of Information Brokers consists of Regional Information Brokers trained by NARIC to successfully access ABLEDATA's product listings. Regional Information Brokers are employed by a variety of rehabilitation related facilities and organizations. They serve as a local access point for product information. The Information Broker provides interpretation of the clients' requests or needs for obtaining information from the database and provides additional

information on local or regional vendor resources and other related services for the products.

Requests for information about equipment may be directed to the Brokers by anyone, including disabled individuals or family members, rehabilitation professionals, manufacturers or vendors, educators, public or private agencies, or researchers. In addition to computer printout information, the Information Broker can provide photocopies of the manufacturer's literature for further detailed information, and for local requests the Broker can provide supplier information, sources for repair and maintenance or other related resources and referrals.

DATA ENTRY FORMAT

The content of each data entry in the files includes the following fields:

AN Accession number (Computer record ID number; includes code for year/month data entered).
NM Generic name of item.
BN Brand name (trade name and/or model number).
MN Manufacturer's name.
CD Manufacturer's and distributor's code numbers to locate address.
AV Availability (major distributors or developer if not commercially available).
CT Cost/date.
DE Description--brief statement describing item.
CM Comments--includes information evaluative data, contraindications, limitations, etc. (from disabled individuals, rehabilitation professionals, etc.)
EV Evaluation--formally documented test results.
ID Identifiers--index terms from controlled vocabulary listed in thesaurus.

Generic Name, Brand Name, Manufacturer, Distributors, Cost and Description are self-explanatory and must be completed for each data entry. The Accession Number is not used for searching the database. The first four digits identify the month and year the data was entered into the system, and the last six digits are a document identification number for internal editing purposes. A Code Number is assigned to each manufacturer and distributor and is used to access a separate file to obtain the address of desired companies. Presently the fields, or paragraphs, for Comments and Evaluation are not completed for all data entries, these are completed as the information is submitted or otherwise available. Comments include informal use evaluation or general comments from disabled individuals, health professionals or anyone desiring to share information regarding products. All data submitted is reviewed before input to the system, and verified if necessary. The Evaluation field is for formally documented evaluation results, primarily from research programs. Evaluation results may be reproduced in total or summarized if lengthy, with references for obtaining the complete results.

The Identifier field is the only paragraph required to use a controlled vocabulary. These terms are assigned from the list of categories and sub-categories listed in the ABLEDATA thesaurus.

The thesaurus for ABLEDATA is being developed simultaneously with the data entries. The Thesaurus includes all controlled vocabulary, or Identifiers, and all generic or common product names listed by category. In addition, a separate and more detailed index is available with all terms indexed alphabetically with alternative terms (or synonyms) and cross-references for appropriate searching terms. The ABLEDATA Thesaurus (2nd edition) is available for $25.00, including postage and all supplements. Searching the database is accomplished by free text searching. This method of searching may use either words designated in the controlled vocabulary or may be searched using any word or phrase in conjunction with applied limitations or operators. Any of the fields or paragraphs may be searched but consistency of terminology within the data entries is particularly critical with free text searching. NARIC provides training workshops specifically for learning to search ABLEDATA.

SAMPLE DATA ENTRY

AN 83-07-006900
NM INSULIN SYRINGE INFUSER
BN ACCU RINGE MODEL SP250, INSULIN PUMP
MN DELTA MEDICAL INDUSTRIES
CD 1372.
AV MANUFACTURER
CT $1,500.00, 0583
DE INSULIN PUMP FOR CONTROLLING BLOOD GLUCOSE LEVELS. UNIT IS SIZE OF A PACK OF CIGARETTES. CLIPPED TO BELT OR WORN IN POCKET. CONNECTING SYRINGE IS INJECTED INTO SKIN AND TAPED. HOLDS FOUR DAY SUPPLY OF INSULIN. USES U-100 UNDILUTED INSULIN. (OTHER CONCENTRATIONS CAN BE USED.) UNIT IS PROGRAMMED TO DELIVER INSULIN AT MULTIPLE TIMES ACCORDING TO THE USERS SELF MONITORED BLOOD GLUCOSE LEVELS. 1 1/16 BY 2 5/8 BY 4 3/8 INCHES. 5 1/2 OUNCES. SYRINGE: 3 CC P3-0-L. BATTERY: NICKLE CADMIUM RECHARGEABLE BATTERY OR NON RECHARGEABLE BATTERY. DELIVERY TUBE: 2 FEET LONG. INTERNAL VOLUME 12 UNITS. NEEDLE: STANDARD LUER HUB, NUMBER 25 TO 27, 1/2 TO 3/4 INCHES LONG. ON/OFF REVERSE CONTROLS. BASE RATE FROM 0.28 UNITS OF INSULIN PER HOUR TO 28 INSULIN UNITS PER HOUR (99 OPTIONS). ID PERSONAL CARE. PERSONAL HEALTH
CM MUST HAVE A DOCTOR'S PRESCRIPTION TO RECEIVE PRODUCT.

The ABLEDATA System is designed as a central database, and is stored at Bibliographic Retrieval Services (BRS) in Latham, New York. It may be accessed anywhere in the country, or internationally, by persons with subscriptions to BRS through special telecommunications lines (i.e., Telenet, Tymnet). BRS subscriptions range from $16.00 to $35.00 per connect hour, and telecommunication charges range from $6.00 to $11.00 per connect hour. There is a $15.00 per hour/$1.5 per citation royalty for public access to ABLEDATA. Each program generates its own policy regarding charging fees for providing searches of ABLEDATA or other databases. Some provide searches free of cost; others have minimal fees. As of 2/1/84, NARIC charges $10.00 per search providing up to 100 citations, and $5.00 for every additional 100 citations (or portion thereof).

21

HOW CAN I ACCESS ABLEDATA'S INFORMATION?

If you would like personal assistance to effectively retrieve ABLEDATA's product information, contact a trained ABLEDATA broker:

ABLEDATA INFORMATION BROKERS

Megan Randall or Barbara Lerner
National Rehabilitation Information Center
4407 8th Street, N.E.
Washington, D.C. 20017-2299
(202) 635-6090

Sue Gaskin
Division of Rehabilitation Services
Department of Human Services
1401 Brookwood Drive
P.O. Box 3781
Little Rock, AR 72203
(501)371-7596

Barbara J. Warren, Information Specialist
PAM Assistance Centre
110 Marshall Street
Lansing, MI 48912
(517) 371-5897

Lynda Harbert
Rancho Los Amigos Hospital, REC
7601 E. Imperial Highway, 500 Hut
Downey, CA 90242
(213)922-8116

Resource Library
Moss Rehabilitation Hospital
12th Street & Tabor Road
Philadelphia, PA 19141
(215) 329-5715

Bill Steenbeke
Independent Living
Memorial Hospital
615 N. Michigan
So. Bend, IN 46601
(212) 284-7450

Jerry Asay
Utah State Div. of Rehabilitation Services
Rehabilitation Service Center
250 East 500 South
Salt Lake City, UT 84111
(801)533-5991

Lois Byrum
Minnesota Division of Vocational Rehabilitation
501 Capitol Square Building
St. Paul, MN 55101
(612)296-6684

Alice B. Kuller
Harmarville Rehabilitation Center
Guys Run Road
P.O. Box 11460
Pittsburgh, PA 15238
(412)781-5700 x 508

Ricardo G. Cerna
Division of Vocational Rehabilitation
131 W. Wilson St. 7th Floor
P. O. Box 7852
Madison, WI 53707
(608)266-1998

Elizabeth Levy
Adaptive Equipment Resource Specialist
Vermont Center for Independent Living
174 River Street
Montpelier, VT 05602
(802)229-0501
(800)622-4555 (Vermont only)

Wendell Fingar
Rehab. Eng. Section
California Department of Rehabilitation
830 K Street Mall
Sacramento, CA 94814
(916)323-2959

June Holt
Massachusetts Rehabilitation Commission
20 Park Plaza, Room 331
Boston, MA 02116
(617)727-1140

Ruth Lampert
Veterans' Administration
252 7th Avenue
New York, NY 10001
(212)620-6702

Roger Levy
Texas Rehabilitation Commission
118 E. Riverside Drive
Austin, TX 78704
(512)445-8000

Carolyn Ramey
Access Alaska
841 E. Dowling Road
Anchorage, AK 99502
(907)563-4060

Anne Holmes
National Deaf-Blind Information & Resource Center
2930 Turtle Creek Plaza
Suite 102
Dallas, TX 75219
(214)522-4540

Helen Stonehill
International Center for Disabled
340 E. 24th Street
New York, NY 10010
(212)679-0100 x 307

Dave Shaffer
Human Resources Center
1 W. Willets Road
Albertson, NY 11507
(516)747-5400

Bibliographic Retrieval Services

If you would prefer to access ABLEDATA directly, it is available to anyone with a subscription to Bibliographic Retrieval Services (BRS). For information regarding the equipment and resources necessary to publicly access ABLEDATA, call or write BRS, 1200 Route 7, Latham NY 12110; 800/833-4707. New York residents call 518/783-1161.

BRS AFTER DARK

To directly access the ABLEDATA or REHABDATA, you must have a subscription to BRS (Bibliographic Retrieval System). The BRS Search Service, which is used by major research centers, corporations and university libraries around the world, is now available to the home computer user. Called BRS/AFTER DARK, this comprehensive new service provides access to information from millions of journals, reports, books and articles via a transparent, user-friendly interface to the sophisticated BRS Search software. Available from 6 p.m. until midnight, local time, the service offers dramatically reduced searching costs during convenient, after-work hours. BRS/AFTER DARK is available for a one-time subscription fee of $75 which covers the search service, the BRS/AFTER DARK Newsletter, electronic mail, and other services. Access to BRS/AFTER DARK costs as little as $6.00 per connect hour, including UNINET telecommunications charges. Further information is available from Cathy Anderson, BRS/AFTER DARK, 1200 Route 7, Latham, NY 12110, 518/783-1161.

HOW ABLE IS ABLEDATA?

In the November 1983 issue of Changing Times Magazine, an article, "Things that help the handicapped help themselves," reported the following information:

"To get a first-hand idea of just how well the computerized product identification system... works, Changing Times sought information on a variety of products selected at random. We requested information on:

"o a hammer that a one-armed person could use,
o a device to help a paralyzed person get into a bathtub,
o an immersible bench that a disabled person can use in a bathtub or shower,
o powered modes of transportation other than expensive electric wheelchairs,
o a means by which a disabled person could summon help in an emergency, and
o clothing designed especially for people with disabilities.

"A few days later we received a package of printouts that informed us that:

"United Pacific Corp., 245 Roosevelt Rd., West Chicago, Ill. 60185, manufacturers a hammer with nail slots in a magnetized head that allows one-hand use. It retails for about $20.

"Twenty-five companies make devices that help people with disabilities get into the bathtub. Items range from a heavy-duty polyvinyl cushion that inflates with water and costs less than $300 to an electric, stainless steel, floor-mounted left priced at more than $2,300.

"Some 47 different bathtub benches and shower stools are distributed by 32 companies. A molded plastic seat with no back support costs $11; a vinyl upholstered chair and backrest with removable arms sells for $265.

"Nineteen manufacturers offer 23 different powered mobility products, starting with a battery-operated metal frame with small wheels and footrests that converts most standard four-legged chairs into motorized vehicles for indoor use. It costs about $860. At the top of the line is a four-wheeled, eight-speed electric cart for either indoor or outdoor travel. It can reach speeds of up to 22 mph and retails for around $3,000.

"Fourteen different models of emergency alert systems are available from manufacturers. A $60 unit consisting of a wireless remote-control signaler that can be clipped to a pocket, bed or wheelchair activates an alarm receiver plugged into a standard outlet up to 100 feet away. At the other end of the spectrum is an exotic $2,300 microprocessor-based system that periodically requests a simple response from the person it is monitoring.

"A variety of 60 lines of men's and women's clothing with special off-and-on features are available from 16 listed manufacturers. Items range from easy slip-on blouses priced at about $5 up to an $85 jacket with Velcro fasteners in the front.

The article goes on to say that

"With the printouts from Abledata you can get a good idea of the variety of products available, who makes them and how much you can expect to pay. Printouts may also include names of local resources and distributors."

Reprinted with permission from Changing Times, The Kiplinger Magazine, November 1983 issue. Copyright 1983 by The Kiplinger Washington Editors, Inc., 1729 H Street NW, Washington, DC. This reprint is not to be altered in any way, except with permission from Changing Times.

THE ABLEDATA USERS' GROUP

The ABLEDATA Users' Group is an association of individuals and organizations who access ABLEDATA regularly. The annual fee is $35. The Users' Group was created in response to the diversity of ABLEDATA's users. The Users' Group accomodates a wide variety of participants by allowing the ABLEDATA staff to target their technical assistance toward specific needs.

For more information, contact ABLEDATA, 4407 Eighth Street NE, Washington, DC 20017, 202/635-6090, TDD 202/635-5884.

SOURCES FOR MORE INFORMATION ON DEVICES: OTHER PRODUCT-RELATED DATA SYSTEMS

Accent on Information, P.O. Box 700, Bloomington, IL 61701.

A commercial computerized product database with data entries organized by categories of equipment and by disability function. Data entries include ideas for how to make or adapt equipment, and organizations of interest to disabled persons. Total database includes 5,400 entries, representing approximately 1,000 companies, developers and organizations. Product printouts are available by mail for a cost of $12.00 for the first 50 entries and $.08 for every additional citation. Photocopies of the literature can be provided for some products. Each data entry lists the product name, cost, and a brief description.

Accent Buyer's Guild grew out of the information system, and lists manufacturers, distributors, and organizations, classified by product type or function. It is an abbreviated version of the database holdings. Information listed includes names and addresses only. Cost is $10.00.

Assistive Device Database System (ADDS)

The Assistive Device Database System (ADDS) is a source of information on adaptive equipment, programs and other resources available to handicapped or disabled persons. ADDS contains information not only on commercially available devices, but also on those which are custom made.

ADDS was originally developed by the Assistive Device Center at California State University, Sacramento for use by college and university counselors who advise disabled students needing assistance to accomplish tasks essential to getting a complete education, especially those students in the fields of sciences and engineering.

ADDS provides information on communication, manipulation, mobility and sensory handicaps. ADDS provides four basic types of information:

- o Devices, including purpose, manufacturer, vendor, cost and skill needed for use.
- o Bibliographic citations, including author, title, source, and abstract.
- o Resource persons, including name, address, phone, organizational affiliation, specialty, and service offered.
- o Service agencies, including name, organization, address, phone, publications, and types of disabilities served.

ADDS is being made available by American International Data Search (AIDS), Inc. ADDS will be available for direct on-line searching through commercial services and computer networks. Initially searches will be performed by the AIDS staff, but can be delivered electronically to your computer or terminal.

If you do not have a computer or terminal or if you prefer AIDS to do the search you may make an information request via a toll-free number or mail in an information request form. American International Data Search can also access other databases of information for the disabled. In most cases, the information will be available within 24 hours.

To initiate a search or to request a search form call 800/275-8700 (in California, 800/223-2437), or write American International Data Search, Inc., 2326 Fair Oaks Blvd., Suite C, Sacramento, CA 95825.

ERIC Clearinghouse on Handicapped and Gifted Children, 1920 Association Drive, Reston, VA 22091, 703/620-3660.

Information on curricula, teaching methods, research, program descriptions, assessment and other topics related to the education of handicapped and gifted children can be found in the Council on Exceptional Children (CEC) quarterly abstract journal Exceptional Child Education Resources (ECER) and in the ERIC monthly abstract journals Resources in Education (RIE) and Current Index to Journals in Education (CIJE). These three publications provide you with abstracts of journal articles, books, research reports, conference proceedings, curriculum guides, project reports, and other types of education literature, both published and unpublished.

You can search the information in these publications manually or by computer. Hundreds of university, professional and public libraries subscribe to ECER, RIE, and CIJE. You can search the subject indexes by hand to find abstracts of articles and documents on your topic. Many of these libraries also offer computer searching of ECER and ERIC (RIE and CIJE). Some libraries are funded to offer free or inexpensive searches to certain groups. If your topic is fairly complex, or you need to have a comprehensive review of the literature, a computer search can save you many hours in the library.

Computer searches of ECER and ERIC are available from CEC Information Services at the following rates:

Regular and Institution Rates

One database (ECER or ERIC) $35.00 (up to 50 abstracts); two databases (ECER and ERIC) $50.00 (up to 100 abstracts).

Special CEC member rates:

One database (ECER or ERIC) $25.00 (up to 50 abstracts); two databases (ECER and ERIC) $40.00 (up to 100 abstracts).

Additional abstracts at $5 per 25; add 10% for postage and handling.

If you need help locating a library near you that offers computer searching or would like to order a search from CEC, call CEC Information Services at 703/620-3660.

The Council for Exceptional Children operates the ERIC Clearinghouse on Handicapped and Gifted Children under a contract with the National Institute of Education.

NARIC

The National Rehabilitation Information Center (NARIC) is a rehabilitation information service and research library funded by the Department of Education, National Institute of Handicapped Research (NIHR) to:

- o facilitate access to NIHR and Rehabilitation Services Administration (RSA) funded research reports,
- o make available information on assistive devices,
- o disseminate other rehabilitation-related information resources.

To meet these goals NARIC operates REHABDATA and its companion database, ABLEDATA. REHABDATA is a computerized listing of NIHR and RSA materials, selected journal articles, audiovisual materials and commercial publications. REHABDATA lists over 10,000 items. The NARIC Library collection contains all materials listed on REHABDATA as well as a variety of fact and referral resources.

The NARIC Library collection constitutes the resource base used to respond to your fact or document requests. The Information Team can either answer your questions or provide accurate referrals. In addition, because the Library houses copies of all REHABDATA materials, you can receive a reproduction of any non-copyrighted document listed on the database.

NARIC, in conjunction with the National Council on Rehabilitation Education (NCRE), annually produces the Rehabilitation Research Review. This series of publications provide a state-of-the-art analysis and discussion of key topics in the field of rehabilitation, including recommendations for future research and an annotated bibliography.

The following is a list of the 1982-83 Rehabilitation Research Review titles and authors.

1. Rehabilitation Education and Training. Michael Scofield, Ph.D.
2. Client Vocational Assessment. Norman Berven, Ph.D.
3. Private Sector: Role of Rehabilitation Professionals. George Wright, Ph.D
4. Process, Issues and Needs in Private-for-Profit Rehabilitation. Mary Ellen Mitchell, Ph.D., Jack M. Sink, Ph.D.
5. Benefit Cost Analysis. Monroe Berkowitz, Ph.D., Edward Berkowitz, Ph.D.
6. Consumerism and Advocacy in Vocational Rehabilitation. Lex Frieden
7. Applications of Telecommunications Technology to Services for Individuals with Disabilities Susanne Bruyere, Ph.D.
8. The Role of the Family in Rehabilitation. R. William English, Ph.D.
9. Incentives and Disincentives in the Vocational Rehabilitation Process. Kurt L. Johnson
10. Rehabilitation and Adults with Learning Disabilities. Joseph A. Szuhay, Ph.D., John M. Williams, Ed.D.
11. Sheltered Employment Services and Programs. Luca E. Conte, Ph.D.
12. Delivery of Vocational Rehabilitation to Rural Populations. Laurel Richards
13. Case Management Techniques. Deborah A. Pape, Ph.D.
14. Contemporary Research on the Vocational Rehabilitation of Persons with Mental Retardation. Harry A. Allen, Ed.D., Donna R. Falvo, Ph.D.
17. Computers in Vocational Rehabilitation: Current Trends and Future Applications. Bruce Growick, Ph.D.
18. Performance Appraisal of Rehabilitation Professionals. William Sather, Ph.D.
19. Low Cost Technical Aids and Self-Help Approaches to Technology: The Benefit for Disabled People. Gregory Dixon, Sandi Enders.
20. Measuring Vocational Rehabilitation Success. Kenneth Reagles, Ph.D.

The 1984 Rehabilitation Research Reviews include:

1. Supported Work/Transitional Employment. Steve Ostby, Ph.D. and Anne Chandler, Ph.D.
2. Importance of Physical Conditioning for Disabled Persons. Peg Nosek and Ray Nofi.
3. Parent Training for Early Intervention. Diane Briker, Ph.D. (Kristine Slentz, Barbara Walker).
4. The Use of Computers to Expand Employment Opportunities for Disabled Persons. William Crimando, Ph.D. and Susan Harrington Godley, Ph.D.
5. The Rehabilitation of Persons with Head Injuries. Ruth Torkelson-Lynch, Ph.D.
6. The Rehabilitation of Autistic Persons. Anne Donnellan, Ph.D.
7. Wheelchairs. Colin McLaurin, Ph.D.
8. Medical Rehabilitation of Persons with Muscular Dystrophy and Other Neuromuscular Diseases. Dr. William Fowler, Jr.
9. Disability and Older Adults. Pamela Finnerty-Fried, Ph.D.
10. The Community Integration of Disabled Persons. Carol Sigelman, Ph.D.
11. The Efficacy of the Independent Living Program Model Based on Descriptive and Evaluative Studies. Lex Frieden.
12. The Use of Computer Technology in Service Delivery to Disabled Persons. Brian McMahon, Ph.D., James Sampson, Ph.D., and Jane Burkhead, Ph.D.

Individual Reviews are $7.50 each; the complete set is $100.00. All prices include postage and shipping in the USA.

While NARIC provides free fact and referral services, other products and services are available for nominal fees. However, no one will be denied access to NARIC's resources because of an inability to pay. For more information, please write, call, or visit:

National Rehabilitation Information Center
The Catholic University of America
4407 Eighth Street, NE
Washington, DC 20017
Phone: 202/635-5826
TDD: 202/635-5884
ABLEDATA: 202/635-6090
REHABDATA: 202/635-5822

NARIC operates under contract with the National Institute of Handicapped Research, U.S. Department of Education (Contract #300-84-0007).

WHERE HAVE ALL THE ASSISTIVE DEVICE DATABASES GONE?

Several product-related databases that were listed in the first edition of the Resource Guide no longer appear to be in operation. These include:

ARIAD: Automatic Retrieval of Information on Assistive Devices
Louisiana Tech University
Rehabilitation Engineering Research Center
P.O. Box 10348
Ruston, LA 71272

Assistive Devices for People with Disabilities
Clinical Convenience Products
2066 Helena Street
Madison, WI 53704

Project Find
Information Center of Greater Birmingham, Inc.
3600 8th Avenue South, Suite 504
Birmingham, AL 35222

STORPROD
University of Washington
Department of Rehabilitation Medicine
BD - 805 H.S.B. Room 30
Seattle, WA 98195

This database doesn't appear to readily serve the general public:

VAREC Information Storage and Retrieval System
Veterans Administration REC
Information & Education Service
252 7th Avenue
New York, NY 10001

SPECIALIZED DATABASES UNDER DEVELOPMENT

Job Accomodation Network (JAN)
P.O. Box 468
Morgantown, NY 26506
1-800-JAN-PCEH

Sponsored by the President's Committee on Employment of the Handicapped, this database will provide information about worksite accomodations for disabled individuals. Accommodations will be listed according to tasks and an individual's functional limitations. It is primarily for employers seeking ways to accommodate disableed employees.

Tech-Knowledge
Center for Rehabilitation Technology, Inc.
Georgia Institute of Technology
Atlanta, GA 30332
404/894-4960.

Tech-Knowledge is an information service of the Center for Rehabilitation Technology, Inc. in Atlanta. This computerized data and information clearinghouse covers such areas as specifications, standards, legal requirements, product research and design, engineering and architecture, and marketing opportunities and business development. This service is available to all organizations by subscription. The search rate for consumers is $3 per hour, while the charge to researchers, organizations and business is $35 for the first search hour and $25 for each following hour. There is a 25% discount to all users after ten hours of search in one year.

ONLINE DATABASES THAT INCLUDE REHABILITATION INFORMATION: A Guide for the Researcher. Sharon McFarland, NARIC, The Catholic University of America, 4407 Eight Street NE, Washington, DC 20017. 202/635-5822 (Information Specialist); 202/635-5884 (TDD). February, 1982.

This guide, prepared by the National Rehabilitation Information Center, lists databases available from the Bibliographic Retrieval Service (BRS) and DIALOG which have rehabilitation information.

Each entry lists the name of the database, which vendor or vendors have the database available, and the file label or number. In addition, a brief description of the database coverage and general subject areas are given, drawn from the database guides written by BRS and DIALOG and search experience at NARIC.

INFORMATION CLEARINGHOUSES

Bioengineering Program, Association for Retarded Citizens (ARC) of the United States, 2501 Ave. J, Arlington, TX 76011.

The purpose of the ARC Bioengineering Program is to improve the quality of life for mentally retarded persons, especially severely/profoundly retarded persons, through technology. Program activities consist of adapting currently available assistive devices for use by retarded persons, developing new assistive devices when needed, and consolidating information on the use of technological aids into a technology resource library.

Edutech, JWK International, 7617 Little River Turnpike, Annandale, VA 22003. 703/750-0500.

Project EduTech, funded by the Special Education Programs office of the Department of Education, is designed to provide technical assistance to state and local education agencies, educators, and other persons interested in the appropriate use of technology in special education. The Project develops reports and other information on technological advances, and maintains an information base in related areas.

EduTech's files contain information on technology, special education issues, companies/vendors, active projects, resource organizations, and funding sources involved in technological development. This material is periodically organized into topical bibliographies, resource guides, and fact sheets, which are used to respond to inquiries.

Some of the materials produced by EduTech include: Election of Micro-Computers; Assistive/Communication Devices; Television Applications in Education; Technology in Special Education Instruction; and Software. The project also maintains an ongoing bulletin board on SpecialNet, a national computerized information network for special education personnel.

Materials Development Center (MDC), Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, WI. 715/232-1342.

MDC is a national central source which collects, develops, and disseminates information and materials in the areas of vocational evaluation and work adjustment.

National Clearinghouse of Rehabilitation Training Materials, Oklahoma State University, 115 Old USDA Building, Stillwater, OK 74078.

National Information Center for Handicapped Youth and Children

The U.S. Department of Education has awarded a three-year contract to InterAmerica Research Associates of Rosslyn, Virginia, to establish the National Information Center for Handicapped Youth and Children. The Center focuses on collecting and sharing information and ideas which may be helpful to children and youths who experience physical handicaps and to the people who work with them. The Center links people with others who share common concerns, sponsors workshops and publishes newsletters. The Center also disseminates information to rural areas and culturally diverse populations.

The Center provides publications about specific areas of interest, addresses of parent organizations, information about other resources, ideas on how to work with schools and other agencies to create the best programs possible, and newsletters which address timely subjects of interest.

Those who may use the services of the Center include: parents of children experiencing handicaps, adults who experience handicaps and wish further information about rights and services, and professionals, students and advocates concerned about the needs and rights of persons experiencing handicaps.

For further information, contact National Information Center for Handicapped Children and Youth, P.O. Box 1492, Washington, DC 20013.

National Organization on Disability (NOD)

The National Organization on Disability has been funded to establish, by mid-1984, an information clearinghouse, directing people to resources that can answer their specific questions. No charge. Contact Jean Fitzgerald, Program Coordinator, National Organization on Disability, 2100 Pennsylvania Avenue, Suite 234, Washington, DC 20039 202/293-5960; 202/293-5968 (TTY).

The Clearinghouse on the Handicapped had developed a computerized database, NISH (National Information Sources on the Handicapped), available through Bibliographic Retrieval Services (BRS). The database contains records of organizations which disseminate information nationally on disability. It is no longer available on the BRS system, but the data is still available in book form:

The Directory of National Information Sources on Handicapping Conditions and Related Services. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock number 017-000-00234-7. $7.50.

The National Clearinghouse on the Handicapped, Office for Handicapped Individuals, Office of Special Education & Rehabilitative Services, Washington, DC 20202, has been reduced to 2 staff members. At the end of this fiscal year, they will no longer produce their free quarterly publication, Programs for the Handicapped, nor will they be updating the above-cited Directory.

SOME LOCAL RESOURCE CENTERS

Also see the list of ABLEDATA System Information Brokers on page 7, as well as the communication service centers on page 208, and seating service centers, page 184.

California

Comprehensive Rehabilitation Center (CRC)
323 North Prairie Avenue
Inglewood, CA 90301
213/673-9090

The CRC is providing a telephone information service for people with disabilities, health professionals and the general community. Access Info is a system providing taped messages on a variety of topics related to disability and rehabilitation. A brochure listing the tapes available on Access Info is available from the Center.

Massachusetts

Independence Associates
693 Bedford Street
Elmwood, MA 02337
617/378-3997

Independence Associates is a good resource for helping solve equipment problems, assisting you with what type of equipment you need and perhaps most importantly advocacy services to deal with funding sources, equipment suppliers, hospital staff, etc. They also have a resource guide, A Survival Handbook for Independent Living Enthusiasts, which includes information on assistive devices.

Michigan

PAM Assistance Centre
601 W. Maple
Lansing, MI 48906
517/371-5897

The PAM Assistance Centre is an information clearinghouse and referral service on assistive devices: what products exist, what they do, how much they cost, and where to get them. They also publish a practical newsletter, the PAM Repeater Individual subscriptions are $5.00/year; organizational subscriptions are $25.00/year.

Missouri

Assistive Device Resource Service
609 Maryland
University of Missouri-Columbia
Columbia, MO 65211
800/392-0533

A primary resource center, serving the State of Missouri, this service provides technical assistance to vocational programs serving handicapped students.

Texas

REHAB TECH (formerly IMPART)
Texas Rehabilitation Commission
Roger Levy, program specialist
118 E. Riverside Drive
Austin, TX 78704
512/445-8338

REHAB TECH is an information and referral service. It provides solutions to individual problems in home, education, or vocational settings.

Vermont

Resource Guide for Augmentative Communication and Adaptive Equipment, Ruth Dennis, OTR, and Susan Edelman, RPT. A compilation of resource and service information to facilitate the processes involved in assessment, purchase, fabrication, training, and repair of equipment, and provide documentation of those resources which are sparse or non-existent in Vermont.

Canada

Disabled Living Resource Centre
Kinsman Rehabilitation Foundation
2256 West 12th Avenue
Vancouver, British Columbia
CANADA
604/736-8841

For information centers with toll free numbers, see the section on **TOLL-FREE NUMBERS**.

TECHNOLOGY INFORMATION EXCHANGE NETWORKS

Confer

Confer is a new computer telecommunications tool that provides a highly effective medium for people to exchange ideas, resolve problems and discuss plans with others within a social network. Confer users connect their computer terminals by telephone with a central computer at Wayne State University to exchange messages and participate in discussions.

During the last half of 1983, the Blissymbolics Communication Institute has been administering the use of Confer as a trial project to identify some of the uses of computer conferencing as they relate to the international field of augmentative communication. During this trial period, attention has been focused on administrative procedures and the new skills and routines required of users, in order that this new medium's capabilities can be appropriately utilized. The particular conference being administered by BCI is called IPC:AC (International Project on Communication: Augmentative Communication).

The fee structure and information regarding IPC:AC can be obtained by writing to Katherine Seybold, Blissymbolics Communication Institute, 350 Rumsey Road, Toronto, Ontario M4G 1R8. 406/424-3806.

HEX (Handicapped Education Exchange)

The Handicapped Education Exchange (HEX) is a computerized bulletin board which is available through the public telephone network. HEX can be reached by dialing 301/593-7033, 24 hours a day, 7 days a week. It is intended as a free service to those involved in the education of, or communications with, the handicapped. For more information, contact Richard Barth, 11523 Charlton Dr., Silver Spring, MD 20902. 301/681-7372 (voice).

HEX can be useful to you as:

- o A way for the handicapped, and those assisting the handicapped, to make known what sorts of devices they need.
- o A way for those qualified to provide technical assistance to disabled individuals to find out what they might be doing to help.
- o A way for those actively involved in designing aids for the disabled to offer suggestions to, and get help from, others who are similarly engaged.
- o A way for those having products, services, or information of potential use to the handicapped to make known their availability.
- o A way of disseminating information about organizations and programs useful to the handicapped.
- o A way of demonstrating the usefulness of computerized bulletin boards to the handicapped.

To "talk" to HEX, you will need either an ASCII or Baudot terminal. The ASCII terminal may be either a simple terminal or a computer which is capable of running at a speed of 300 baud, using 8 data bits, no parity and 1 stop bit. It should be equipped with a Bell 103-type modem. Baudot callers should use a standard Telecommunication Device for the Deaf (TDD), also known as a TTY (teletypewriter). HEX is set up so that it can handle an ASCII or Baudot caller, automatically, on the same line.

HEX serves as a means of exchanging ideas and information concerning application of technology to aid disabled people. If you have an ASCII or Baudot terminal, dial HEX and take a look at the information already on it. If you have something that you would like to pass along to others in the field, you can easily enter it as a new message.

HEX is operated by AMRAD, the Amateur Radio and Development Corporation. It is funded by a grant from the Office of Special Education, U.S. Department of Education.

SpecialNet

The special education communication information network SpecialNet is part of a large computer network that provides telephone access in over 250 U.S. cities. SpecialNet features electronic mail, topical bulletin boards, and data collection/information management systems. Organizations and individuals subscribing to SpecialNet can communicate via electronic mail. Information transmitted concerns conferences, computers, litigation, RFP, consultants, employment, EDutech, Congress, opinions and other related topics. A subscription to SpecialNet costs $200 per year plus a charge for actual time connected to the system. To subscribe to SpecialNet, contact National Association of State Directors of Special Education, 1201 Fifteenth Street NW, Suite 404E, Washington, DC 20036.

The Prentke Romich Company (PRC) is managing one bulletin board on SpecialNet, ASSISTIVEDEVICE. If you have assistive device announcements in the following areas that you would like posted on the board, please contact PRC by calling, or writing through the electronic mailbox address (user name = PRC). PRC is looking for information on:

1. Seminars/workshops regarding the use of assistive devices.
2. New product announcements.
3. Used assistive devices for sale or purchase.
4. New resources/texts/materials regarding assistive devices.

A separate item to be developed and posted on the bulletin board will be FUNDING. PRC will post source (i.e., insurance company), address, type of device funded (i.e., communication aid, environmental control system). If you have specific information you would like to share, please contact Prentke Romich Company, 8769 Township Road 513, Shreve, OH 44676, 216/567-2906.

For more information on electronic bulletin boards and information exchange networks, see the section on **MICROCOMPUTER APPLICATIONS**, page 241-242.

INTERNATIONAL INFORMATION ON TECHNICAL AND INFORMATION SYSTEMS

European Technical Aids Information System

The European Economic Community (EEC) is developing a new technical aids system for disabled persons. Called "Handynet", the system consists of two parts: Handyaids, which lists information on technical aids available in EEC countries and Scandinavia; and Handywho, which carries information on professionals and organizations that develop or provide technical aids in these countries.

Long-range plans include: Handysearch, an inventory of research in the field of technical aids; Handyce, information on EEC documents and legislation concerning disabled persons; and Handynews, a service that reports new developments, meetings and conferences on technical aids.

For more information, contact Patrick Daunt, Head, Bureau for Action in Favor of Disabled People, Al 613 200, rue de la Loi, B-1049, Brussels, Belgium.

International Commission on Technical Aids, Housing, and Transportation (ICTA)

A commission within Rehabilitation International. Located in Stockholm, Sweden, it promotes an international exchange of information through publications, conferences, and seminars. Contact ICTA Information Centre, FACK, S-161 25 Bromma 1, Sweden.

Information Systems as Technical Aids for the Disabled: A Transnational View. James F. Garrett, Editor. Rehabilitation International USA, 1123 Broadway, New York, NY 10010. $20.00. 1982.

Four papers from the 1981 conference in Bellagio, Italy, sponsored by the Rockefeller Foundation.

Information Services on Technical Aids for People with Disabilities: An International Perspective. Barbara Duncan, Editor. 1132 Broadway, New York, NY 10010. $20.00. 1982.

This book is the proceedings of the First International Conference on Information Systems on Technical Aids for People with Disabilities, held October 4-8 in Bellagio, Italy. An exploration of the best ways to promote international exchange of information on technical aids. There is an international overview of technical aid information systems in Sweden, England, Australia, Germany, Italy, Japan and the U.S. The proceedings also include a resource section listing information, publications and journals on technical aids and services available for individuals who experience handicaps.

RESEARCH AND DEVELOPMENT PROGRAMS ON TECHNICAL AIDS

THE FEDERAL GOVERNMENT'S INVOLVEMENT IN DISABILITY-RELATED TECHNOLOGY R&D

"The official role of the Federal Government in vocational rehabilitation, prosthesis research, and other disability-related research dates back to the 1930's and 1940's. The presence of the Federal Government as a purchaser of devices to aid disabled people reaches back even further to the years following the Civil War. Much of the groundwork for the current system of rehabilitation research was laid in the 1940's by the National Academy of Sciences and the armed services in response to the postwar needs of veterans. A large share of the initial research was conducted by the Department of Defense (DOD) and the Veterans Administration (VA) on prosthetic devices. Prosthetics research, along with an expanded focus on other areas of disability-related research, still continues in the VA system. The present-day Rehabilitation Services Administration (RSA) had its beginning as the Office of Vocational Rehabilitation within the then Department of Health, Education, and Welfare (DHEW) in the early 1950's. Since these early efforts, the range and depth of the Federal initiative have expanded markedly. In addition, this area of R&D has steadily gained increased attention and recognition by the Federal Government over the years, though it remains small in comparison to the immensity of the problems involved. The private and nonprofit sectors of our society have also become increasingly involved in disability-related products and services."

from Technology and the Handicapped, Office of Technology Assessment (OTA), U.S. Congress, Washington, DC, 1982.

National Institute of Handicapped Research, Department of Education, 400 Maryland Avenue, SW, Washington, DC

The National Institute of Handicapped Research (NIHR) provides leadership and support for a national and international program of comprehensive and coordinated research regarding the rehabilitation of handicapped persons, and sees that this knowledge is made available to those who can best use it. Developing and applying new technologies to this effort is the main focus of the Institute's Rehabilitation Engineering Centers.

Each center is encouraged to establish official working relationships with institutions of higher learning in medicine, engineering, and related sciences, and to assist in the development of manpower and training programs through which the technique, hardware, and systems development can be introduced safely into the service delivery systems. Duplication of effort is avoided through intercenter coordination. Each center has an approved core of research emphasis and each reflects the needs of major patient populations of the center. In the following list, the respective core area of research, and a brief description of specific focus, is listed beneath each REC.

Current NIHR-Supported Rehabilitation Engineering Programs

CASE WESTERN RESERVE UNIVERSITY SCHOOL OF MEDICINE, School of Medicine, 2119 Abington Road, Cleveland, OH 44105, 216/444-4900. P. Hunter Peckham, Ph.D.

Functional Electrical Stimulation: Research on restoration of neuromusculoskeletal impairment by functional electrical stimulation; closed loop control of electrically stimulated muscles to improve FES orthoses for restoration of hand function; therapeutic applications of FES for management of abnormal muscle contractions in cerebral palsy; biofeedback system for replacement of tactile information in quadriplegic; development of external control logic and percutaneous stimulation systems.

CEREBRAL PALSY RESEARCH FOUNDATION OF KANSAS, INC., P.O. Box 8217, 2021 N. Old Manor, Wichita, KS 67208, 316/688-1888l. John F. Jonas, Jr., John H. Leslie.

Work Site Modification: Research on worksite modification using technology systems approaches -- to determine whether generalizable principles of design are feasible for neurologically impaired persons; develop taxonomy of performance characteristics; investigate the occupationally significant physical skills of pre-vocational disabled; develop an Available Motions Inventory; develop determined time standards; investigate use of robotic arm; design interfaces with computer, communication devices, and word processors; develop head wand; make and install tooling or adaptive devices for production lines in at least three sheltered workshops.

DALLAS REHABILITATION FOUNDATION, 7850 Brookhollow Road, Dallas, TX 75235, 817/273-2249, 214/637-0740. Raymond Dabney, Alfred R. Potvin.

Quantification of Human Performance: Research on improved method of quantification of human performance; refinement, expansion, clinical evaluation, and commercialization of the sensory and motor function.

ELECTRONIC INDUSTRIES FOUNDATION, 2001 Eye Street NW, Suite 405, Washington, DC 20006, 202/457-4900. John Walsh.

Evaluation of Technology & Stimulation of Industry: foster a commercialization process to lead to increased availability of assistive devices for handicapped; stimulation of industry to participate in production, marketing and distribution of devices; developing criteria for selection of devices for testing; development of evaluation protocol.

GALLAUDET COLLEGE, Division of Research, 400 Florida Avenue NE, Washington, DC 20002, 202/651-5440. Raymond J. Trybus, Ph.D.

Sensory Aids for Deaf and Hearing Impaired: research into the various technologies for the deaf.

The program of the Center consists of research and development to apply current and emerging technologies for the alleviation and solution of problems caused by deafness, ranging from mild to profound hearing loss. The major focus is on the difficulties in speech communication between deafened and hearing persons.

HARVARD-MIT, Children's Hospital Medical Center, 300 Longwood Avenue, Boston, MA 02115, 617/735-6594. William Berenberg, M.D.

Quantification of Human Performance: Research on improved method of quantification of human performance; improved methods of quantification of performance by assessing changes in range of motion; strength and segmental mobility of the spine; quantitative measures for monitoring effects of intervention strategies for treatment of arthritic condition.

THE LEXINGTON CENTER, INC., Rehabilitation Engineering Center, 30th Avenue and 75th Street, Jackson Heights, NY 11370. Alan Lerman, Ph.D.

New Generation Hearing Aids.

NORTHWESTERN UNIVERSITY, 345 E. Superior St., Chicago, IL 60611, 312/649-8560. Dudley Childress.

Prosthetics & Orthotics: development of durable, modular and inexpensive myoelectric prehension devices for amputees; artificial arms; limb extension mechanisms; rigid knee ambulation; design and development of knee orthoses; prehensile terminal headpointers; microprocessor-based powered wheelchairs and environmental control units; joint replacement-hip prostheses, knee replacements.

RANCHO LOS AMIGOS HOSPITAL, 7601 East Imperial Highway, Downey, CA 90242, 213/922-7167. Robert Waters, Donald McNeal.

Functional Electrical Stimulation: Improved techniques of functional electrical stimulation; improved methods of gait training and upper extremity rehab through application of electrical stimulation and biofeedback; multichannel FES implanted into body to activate muscles in lower extremities; correction of spinal deformities by FES; acute and chronic FES for incontinence control; effects of stimulus wave form and electrodes on comfort during controlled motor contraction.

LOUISIANA TECH UNIVERSITY, P.O. Box 10348, Ruston, LA 71272. 318/257-4562. Duane F. Bruley, Ph.D.

Transportation of the Handicapped -- Personal Licensed Vehicles.

UNIVERSITY OF VERMONT, Burlington, VT 05405. 802/656-4631. John W. Frymoyer, M.D.

Rehabilitation in lower back pain.

SMITH-KETTLEWELL INSTITUTE OF VISUAL SCIENCES, 2232 Webster Street, San Francisco, CA 94115 415/563-2323. Arthur Jampolsky, MD, John Brabyn.

Sensory Aids -- Blind and Deaf: Development and evaluation of sensory aids for blind and deaf individuals.

SOUTHWEST RESEARCH INSTITUTE, Electronic Systems Division, P.O. Drawer 28510, 6220 Culebra Rd., San Antonio, TX 78284, 512/864-5111. Sam McFarland.

Evaluation of Technology & Stimulation of Industry: evaluation of product performance through development of standards, user tests of suitability, and clinical evaluation of effectiveness; dissemination of information through publication, computer data files, and educational curricula.

TRACE CENTER, University of Wisconsin, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53706, 608/262-6966. Gregg C. Vanderheiden.

Communication Systems: Research on access to communication, control, and information processing systems; develop quantitative measures of progress; determine state-of-the-art devices for non-vocal persons; study characteristics of target population and process of augmentative communication; quantitative measures of minimum functional levels; determine whether technology can facilitate language therapy or processing; increase rate of control with aids; develop interfaces for extremely motor-impaired individuals.

TUFTS UNIVERSITY, Tufts New England Medical Center, Department of Rehabilitation Medicine, Box 1014, 171 Harrison Avenue, Boston, MA 02111, 617/956-5036. Richard Foulds.

Communication Systems -- develop visual line of gaze communication system; develop second generation oculometer, system with videocamera, processing electronic and microcomputers using corneal reflection-pupil center method; ocular interface for commercial microcomputers; test use of proportional control; examine single fingerend typing; technique for generating unit sets for single-switch aids.

UNIVERSITY OF MINNESOTA, Department of Physical Medicine and Rehabilitation, c/o ORA, 1919 University Avenue, St. Paul, MN 55455, 612/373-8990. G. Gullickson, M.D., R. Patterson, Ph.D.

Quantification of Human Performance: improved methods of quantification of performance by assessing changes in range of motion; strength and segmental mobility of the spine; quantitative measures for monitoring effects of intervention strategies for treatment of arthritic condition.

UNIVERSITY OF VIRGINIA MEDICAL CENTER, Department of Orthopedics & Rehabilitation, P.O. Box 209/UVA, Charlottesville, VA 22908, 804/977-6730. Colin A. McLaurin.

Wheelchairs: Improved wheelchair systems and specialized seating; research on human factors in propulsion; seating and body support; analysis and design of structural components and systems for wheelchairs; power system.

International

REHABILITATION INSTITUTE, Linhartova 51, Ljubljana, Yugoslavia. Alojz Kralj.

Functional Electrical Stimulation: enhancement of applicability of FES devices and therapies of paralytic patients; FES of spinal cord injured patients, restoration of locomotion; quantification of effects of electrical stimulation in patients with urinary disorders.

NIHR also funds a number of other rehabilitation research and training centers which can provide information on disability-related technology:

CARROLL CENTER FOR THE BLIND, 770 Centre St., Newton, MA 02158, 617/969-6200. Rachel E. Rosenbaum.
Aids and Appliances Review: a journal concerned with blindness and low-vision rehabilitation.

HUMAN RESOURCES CENTER, I.U. Willets Road, Albertson, NY 11507, 516/747-5400. Jack Victor, Ph.D.
Research on Employability of Handicapped Individuals

INSTITUTE FOR INFORMATION STUDIES, 200 Little Falls Street, Suite 404, Falls Church, VA 22046, 703/533-0383. Elizabeth Pan, Ph.D.
REHAB BRIEF: publication issued monthly summarizes findings of NIHR research and disseminates it to 30,000 users.

MISSISSIPPI STATE UNIVERSITY, P.O. Drawer LQ, Mississippi State, MS 39762, 601/325-2001. William H. Graves, Ph.D.
Rural Independent Living Skills and Services

NATIONAL ASSOCIATION OF THE PARTNERS OF THE ALLIANCE, INC., PATH Americas Program, 1424 K Street NW, Washington, DC 20005, 202/628-3300. Gregory Dixon.
Interagency Agreement with USIA PATH Americas Program: focuses on needs of handicapped children and adults in the Americas.

NATIONAL REHABILITATION INFORMATION CENTER (NARIC), Catholic University of America, 4407 Eighth Street NE, Washington, DC 20017, 202/635-5822. Susan Flowers. See page 10.

PENNSYLVANIA COLLEGE OF OPTOMETRY, Office of Academic Development, 1200 W. Godfrey Avenue, Philadelphia, PA 19141, 215/424-5900. Laura Edwards.
Orientation of Mobility Research for Persons with Low Vision

REHABILITATION INTERNATIONAL -- USA, 1123 Broadway, New York, NY 10010, 212/620-4040. Philip Puleio, Ph.D.
RIUSHARE: Program to upgrade utilization of innovations and information from international rehabilitation.

STOUT VOCATIONAL REHABILITATION INSTITUTE, University of Wisconsin/Stout, Menomonie, WI 54751, 715/232-1464. Daniel C. McAlees.
Research on Sheltered Transitional Employment

UNIVERSITY CENTER FOR INTERNATIONAL REHABILITA 513 Erickson Hall, Michigan State University, East Lansing, MI 48824, 517/355-1824. William Frey, Ph.D.
International Research Information and Training Center

UNIVERSITY OF ARKANSAS, Board of Trustees, Fayetteville Campus, Fayetteville, AR 72701, 501/371-1654. Douglas Watson, Ph.D.
Improving Vocational Rehabilitation in Postsecondary Education Programs for Deaf Individuals

WORLD REHABILITATION FUND, INC., 400 E. 34th Street, New York, NY 10016, 212/679-2934. Diane Woods.
International Exchange of Experts and Information in Rehabilitation

Other Rehabilitation Engineering Programs

These programs have in the past received support from NIHR; most have continued R&D work in their specialty areas.

CHILDREN'S HOSPITAL AT STANFORD, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA 94304, 415/327-4800. Maurice A. LeBlanc.
Controls and interfaces

INSTITUTE OF REHABILITATION MEDICINE, New York University, 400 E. 34th Street, New York, NY 10016, 212/340-6015. Joseph Goodgold.
Evaluation of Functional Performance of Devices for Severely Disabled Individuals

TEXAS INSTITUTE FOR REHABILITATION AND RESEAR 1333 Moursund Avenue, Houston, TX 77030, 713/797-1440. Thomas A. Krouskop.
Effects of pressure on tissue

THE UNIVERSITY OF IOWA, Carver Pavilion, Iowa City, IA 52242, 319/356-3470. R. R. Cooper, Richard A. Brand, Y. King Liu.
Low Back Pain

THE UNIVERSITY OF MICHIGAN, 208 W. E. Lay Automotive Lab, 2320 Herbert Street, Ann Arbor, MI 48109, 313/763-6632. J. Raymond Pearson
Automotive Transportation for the Handicapped

UNIVERSITY OF TENNESSEE, 532 S. Stadium Hall, Knoxville, TN 37916. Carl Asp, Ph.D.
Hearing aids

UNIVERSITY OF TENNESSEE, Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163, 901/528-6445. Douglas Hobson.
Aids for Handicapped Children

International

INSTITUTE OF ORTHOPEDIC SURGERY AND REHABILITA TION, Academy of Medicine, Dzierzynskiego 135, 61 545 Poznan, Poland. A. Senger.
Upper extremity disabilities

WATA WA AMAL, Mugamaa Building, Tahrir Square, Cairo, Egypt. Sahah Hommossani.
Architectural barriers

Veterans Administration

VA has been involved in disability-related technology research since the late 1940's. For many years, VA was the primary supporter of federally sponsored research in this area, especially in the field of prosthetics research. In the last few years, VA has expanded its disability-related research focus to include a broader range of areas. The establishment of the Rehabilitation Engineering Research and Development (RER&D) program is the VA's response to the increased research and service needs of the veteran population and of disabled people in general.

REHABILITATION RESEARCH & DEVELOPMENT, Central Office, Veterans Administration Central Office, 810 Vermont Avenue, Washington, DC 20420, 202/389-5147.

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Decatur Veterans Administration Hospital, 1670 Claremont Road, Decatur, GA 30033, 404/321-6111.

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Hines Veterans Administration Hospital, Box 20, Hines, IL 60141, 313/343-7200.

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Palo Alto Veterans Administration Hospital, Mail Stop 153, Palo Alto, CA, 415/493-5000, x 5464.

Office of Special Education (OSE), Department of Education, 400 Maryland Avenue, SW, Washington, DC.

OSE is the third largest Federal supporter of disability-related research, and the largest in the area of educationally related efforts.

Other Federal Agencies

NASA and NSF are also involved in hardware-oriented research in this area.

National Science Foundation (NSF), 1800 G Street, Washington, DC 20202.

NASA Technology Utilization Office, Rehabilitation Programs, 400 Maryland Avenue SW, Washington, DC 20546, 202/755-3720.

NASA has been involved in transferring technology and information gained from its bioengineering efforts, as well as its general research efforts, to the health care sector since the late 1960's. Biomedical applications teams attempt to identify and interpret national trends in medicine as well as technology-related problems in health-care delivery, and develop potential solutions to these problems through the use of aerospace technology.

Another mechanism that NIHR and other Federal agencies involved in this area use is the Interagency Committee on Rehabilitation Engineering.

This working group is composed of representatives from the National Science Foundation, the National Council on the Handicapped, the National Bureau of Standards, the National Aeronautics & Space Administration, the Veterans Administration, the National Institute of Handicapped Research, the Department of Health and Human Services, the Department of Transportation, the National Institute of Neurological and Communicative Disorders and STroke, and the Senate Committee on Labor and Human Relations. This Interagency Committee was instrumental in the development of NIHR's Long-Range plan.

The Private Sector Role in Disability-Related Research

"It is difficult to characterize the 'private sector' involvement in disability-related research. The private sector may mean a large, multi-national, multi-product, billion-dollar-a-year company like the Johnson & Johnson Corp., or it may mean a small, single-product firm like Amigo Sales Co., or possibly a private nonprofit organization such as the Cystic Fibrosis Foundation or Muscular Dystrophy Association. These diverse organizations provide a wide variety of products and services to disabled people. However, each is quite different from the others in terms of priorities, resources, and function. Manufacturers of health-related devices that specifically serve disabled people are frequently referred to as part of the medical device industry. In addition, there are thousands of agencies that derive their funds from charity or provide philanthropic services; these may be foundations, service organizations, funds, or associations. The medical device industry and charitable foundations and related organizations are both extremely diverse groups that exist to serve an equally diverse 'market'."

Technology and the Handicapped, OTA, 1982.

More information on federally funded R&D efforts can be found in the publications listed in the Public Policy section of **FUNDING, MODELS, POLICY, STATISTICS**, page 261, in this Sourcebook. "Research and Development," Chapter 6 of Technology and Handicapped People, Office of Technology Assessment (OTA), US Congress, 1982, provides a good overview of the process and players.

LOCATING R&D PROJECTS

AAAS Project on the Handicapped in Science. 1776 Massachusetts Avenue NW, Washington, DC 20036; 202/467-4496 (voice or TTY). The American Association for the Advancement of Science (AAAS) Project on the Handicapped in Science is beginning a new program, funded by the National Science Foundation, to bridge the gap between the researchers and developers of technologies and the disabled people who are potential users of the technologies. As a first step, the project will review completed and ongoing research and development work to aid handicapped persons. This will include identifying research projects funded by NSF and other federal agencies, searching scientific literature to locate other disability-related R&D projects, and organizing information from disabled user groups and individuals. The Project on the Handicapped in Science hopes to call attention to the field of disability research and to expand the benefits it offers to disabled individuals by more widely involving the scientific and engineering community in disability research, including disabled individuals in the R&D process, and increasing the public's awareness of these issues. The project will be directed by Martha Ross Redden and Virginia Stern.

Technology R&D Publications

Journal of Rehabilitation R&D, formerly the Bulletin of Prosthetics Research. Sheldon Todd, Ed. Address correspondence to: Office of Technology Transfer (153D), 252 Seventh Avenue, New York, NY 10001. Quarterly journal on rehabilitation engineering research & development. One issue each year will be devoted to progress reports for all VA Rehab R&D projects, as well as reports from other Federal Agencies such as the National Institute on Handicapped Research, the National Institutes of Health, and from other domestic and foreign research scientists.

Rehabilitation Engineering Society of North America, Proceedings from the Annual Conferences on Rehabilitation Engineering. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. The annual compilation of the scientific papers presented at the yearly rehabilitation technology conference.

Reports from the federally-funded projects listed in this section can be obtained from the individual centers, or from the National Rehabilitation Information Center (NARIC); **See Information Resources, page 10.**

Reports on international R&D projects can be obtained through projects such as UCIR, RIUSA, World Rehabilitation Fund, all listed under NIHR-supported projects.

35

TOLL-FREE NUMBERS RELATED TO PRODUCTS FOR DISABLED PEOPLE

800 telephone numbers are nothing new, but you might be surprised by how many companies have them. Expert advice on choosing or using a device may be only a call away. And because it's free, it's worth a try.

By dialing (800)555-1212, you can find out if a manufacturer has a toll-free number. Or if you want more than 35,000 toll-free numbers listed both by company and category, write to Toll-Free Digest, Box 800, Claverack, NY 12513 or call (800)447-4700 to order the 480-page book. It costs $10.95 plus $2 shipping.

Except where noted, use 800 number only outside the respective state.

A-BEC
Torrance, CA
800/421-2269
800/262-1331 in California

Abest
see Newton, USA

Abbey Medical, Inc.
Subsidiary American Hospital Supply Corp.
Hawthorne, CA
800/421-5186

Abbott Laboratories
North Chicago, IL
800/942-9255
800/323-9067 in Illinois

Active Aid
Redwood Falls, MN
800/533-5330

Aeroceuticals Health Care Products
Southport, CT
800/243-9876

Ajay
Delavan, WI
800/558-3276

Alimed, Inc.
Boston, MA
800/225-0211

Allied Healthcare Products, Inc.
Chemetron Medical Division
St. Louis, MO
800/325-3890

Alpha Unlimited
800/237-6836

AMEREC Corporation
Bellevue/ WA
800/426-0858

American Health Sciences
Phoenix, AZ
800/528-0181

Amigo Sales, Inc.
Bridgeport, MI
800/248-9130

Aquatherm Products Corp.
Rahway, NJ
800/526-4296

Ascher Surgical Supplies, Inc.
Philadelphia, PA
800/523-1300

B-D Drake Willock
Portland, OR
800/547-5534

B&F Medical Products, Inc.
Toledo, OH
800/537-3419

Ballert Orthopedic Corp
Chicago, IL
800/345-3456

Banyan International Corp
Abilene, TX
800/351-4530

Battle Creek Equipment Co.
Battle Creek, MI
800/253-0854

Be Mar Surgical Supply Co.
Centerport, NY
800/645-5322

Bell-Horn
Philadelphia, PA
800/523-4518

Bio Clinic Co.
San Bernardino, CA
800/854-2369

Biomega Corp.
Gainesville, FL
800/874-7878

Biosearch Medical Products, Inc.
Somerville, NJ
800/526-5976

Biostim, Inc.
Princeton, NJ
800/257-5184

Otto Bock
Minneapolis, MN
800/328-4058

Borg Textile Corp.
Chicago, IL
800/241-8992

E.F. Brewer Co.
Menomonee Falls, WI
800/558-8777

Briox Technologies, Inc.
Worcester, MA
800/225-7496

John Bunn Co.
Tonawanda, NY
800/828-7331

The Burdick Corporation
Milton, WI
800/356-0701

Canyon Products
Simi Valley, CA
800/221-5499

Carrom Health Care Products
Maryland Heights, MO
800/325-4004

Cheesebrough Pond's Inc.
Hospital Products Divison
Greenwich, CT
800/245-5320

Cleo Living Aids
Cleveland, OH
800/321-0595

Clinical Data Instruments, Inc.
Brookline, MA
800/225-9180

The Clinipad Corporation
Guilford, CT
800/243-6548

Colson Equipment, Inc.
Caruthersville, MO
800/325-4126

Conco Medical Co.
Bridgeport, CT
800/243-2294

Control Products
Stockton, CA
800/344-3288
800/692-3453 CA only

Except where noted, use 800 number only outside the respective state.

Convacare, Inc.
Raleigh, NC
800/662-8735 NC only

Creative Rehabilitation Equipment
Portland, OR
800/547-4611

Crow River
Wayzata, MN
800/328-3632

Cryo-2
Fort Pierce, FL
800/327-0313

Cyborg Corp.
Newton, MA
800/343-4494

DME Systems, Inc.
Temple Terrace, FL
800/237-9023

Dale Medical Products
by Baka Mfg. Co., Inc.
Plainville, MA
800/343-3980

Dart Medical, Inc.
Mason, MI
800/248-9618
800/292-3912 MI only

Desemo
Savannah, GA
800/342-7661

Detecto Scale Co.
Great Neck, NY
800/845-6524

Dillon Manufacturing Co.
Norcross, GA
800/241-7492

Dixie USA, Inc.
Houston, TX
800/231-6230

Don Joy Orthopedic
Carlsbad, CA
800/336-6569

Donley Battery Co.
Los Angeles, CA
800/423-3934

DRIpride
Div. of Weyerhauser Co.
Fremont, MI
800/253-3078

Duro-Med Industries, Inc.
Hackensack, NJ
800/526-4753

Dynamed Corp/ Dynarex Corp.
Elmsford, NY
800/431-2786

Elmer's Weights, Inc.
Lubbock, TX
800/858-4568

EMPI, Inc.
Fridley, MN
800/328-2536

EquipMed Corp.
Lake Forest, IL
800/323-9790

Erie Medical
div. of Erie Mfg.
Milwaukee, WI
800/558-3916

Flaghouse, Inc.
New York, NY
800/221-5185

John B. Flanerty Co.
Bronx, NY
800/221-8742

Fox Medical Products
Los Angeles, CA
800/421-4210
800/252 -0500 CA only

Freeman Manufacturing Co.
Sturgis, MI
800/253-2091
800/632-2015 MI only

Frohock-Stewart, Inc.
Northboro, MA
800/243-6059

GAMBRO, Inc.
Barrington, IL
800/323-4156

Gaymar Industries, Inc.
Orchard Park, NY
800/828-7341

Genac Incorporated
see Theradyne

Gendron, Inc.
Archbold, OH
800/537-2521

George Clove Co., Inc.
Englewood, NJ
800/631-4292

Gottfried Medical, Inc.
Toledo, OH
800/537-1968

Graham-Field Surgical Co., Inc.
New Hyde Park, NY
800/645-8176

Grant Airmass Corp.
Stamford, CT
800/243-5237

John F. Greer Corp.
Oakland, CA
800/227-0992

Gresham Driving Aids, Inc.
Wixom, MI
800/521-8930

Hard Mfg. Co.
Buffalo, NY
800/828-7148

Dave Harrison Products, Inc.
Bowie, TX
800/433-0918
800/772-0845 TX only

Harvy Surgical Supply Corp.
Flushing, NY
800/221-0142

Hausmann Industries, Inc.
Northvale, NJ
800/526-0289

Heelbo, Inc.
Niles, IL
800/323-5444

Her-Mar Inc.
Miami Beach, FL
800/327-8209

Humane Restraint Co., Inc.
Madison, WI
800/356-7472

Humanicare International, Inc.
East Brunswick, NJ
800/631-6270

The Huntleigh Group, Inc.
New York, NY
800/223-1218

The Independence Chair Co., Inc.
Waukesha, WI
800/558-2151

Inmed Corp.
Norcross, GA
800/241-1926

Intec Medical, Inc.
Blue Springs, MO
800/821-8598

Intermed Inc.
Sparta, NJ
800/631-3689

Invacare Corporation
Elyria, OH
800/321-5715
800/362-7415 Ohio only

Jefferson Industries, Inc.
Princeton, NJ
800/257-5145

Except where noted, use 800 number only outside the respective state.

Johnson & Johnson Products, Inc.
Patient Care Division
New Brunswick, NJ
800/526-2459

Jordan Plastics Corporation
PLASTA-MEDIC
Carson, CA
800/421-5536

LaJolla Technology, Inc.
San Diego, CA
800/854-1915

Labtron Scientific Corporation
Hauppauge, NY
800/645-9066

Lattoflex International
Hudson, NY
800/341-1522

Lec Tec Corp.
Eden Prairie, MN
800/328-6276

Leisure Lift Chairs
Kansas City, KS
800/255-4147

Lifeline Systems
Massachusetts
800/343-4632

Lossing Orthopedic
Minneapolis, MN
800/328-5216

Lotus Health Care Products
Naugatuck, CT
800/243-2362

Lumex
Bay Shore, NY
800/645-5272

The Lumiscope Co., Inc.
Edison, NJ
800/221-5746
800/221-5747

MGI Strength/Fitness Systems Inc.
Independence, MO
800/821-3126

Maclaren
New York
800/233-1224

MacLevy Products Corp.
Elmhurst, NY
800/221-0277

Mada Medical Products, Inc.
Carlstadt, NJ
800/526-6370

Marathon Medical Equipment
Denver, CO
800/525-0654

Marcy Fitness Products
Alhambra, CA
800/423-3920

Mark One Healthcare Products, Inc.
a member of the Seton Group
Philadelphia, PA
800/523-3660

Medela, Inc.
Crystal Lake, IL
800/435-8316

MEDFURN Systems
Flushing, NY
800/847-4018

Medi Inc.
Holbrook, 12640, 30590, MA
800/225-8634

Medical Devices, Inc.
St. Paul, MN
800/328-0875

Medical Devices International Corp.
Waukegan, IL
800/323-9035

Medical Specifics
Dallas, TX
800/448-4511 x 304
800/962-1480 x 304 NY only

Medpro, Inc.
East Brunswick, NJ
800/526-0988 x 121

Medtek Corporation
Princeton, NJ
800/257-5103

Medtronic, Neuro Division
Minneapolis, MN
800/328-0810

Minnetonka, Inc.
Minnetonka, MN
800/328-5927
800/328-5926

Mistogen Equipment Co.
Oakland, CA
800/227-0525

Mobility Plus
Santa Paula, CA
800/325-7397

Mobilizer Medical Products
Mount Vernon, NY
800/431-1720

Mor-Loc Corporation
Claremont, NC
800/438-9201

Motion Designs
Clovis, CA
800/888-2827
800/888-2837

Mountain Medical Equipment, Inc.
Littleton, CO
800/525-8950

Mulholland
see Mobility Plus

John Nageldinger & Son, Inc.
Westbury, NY
800/645-3496

NARCO Scientific, Air Shields Division
Hatboro, PA
800/523-5756

National Wheel-O-Vator, Inc.
Patterson, LA
800/551-9095

Neuromedics, Inc.
Clute, TX
800/231-2330
800/392-3726 TX only

Newton, USA
Rochester, NY
800/828-6284

Nissen Corp.
Cedar Rapids, IA
800/553-7901

OTC Professional Appliances
Cincinnati, OH
800/543-0458

Orthion Corporation
Costa Mesa, CA
800/854-6900

Ortho-Med, Inc.
Portland, OR
800/547-5571

Otto Bock
Minneapolis, MN
800/328-4058

OWL Biomedical
Charlotte, NC
800/828-1186

Oxygen Enrichment Company, Ltd.
Schenectady, NY
800/833-4751

PCP-Champion
Ripley, OH
800/543-0458

Palmer Industries
Endicott, NY
800/847-1304

Parke Davis & Co.
Med/Surg Division
see Professional Medical Products

Except where noted, use 800 number only outside the respective state.

Parker Laboratories, Inc.
Orange, NJ
800/631-8888

Polychem Corporation
New Haven, CT
800/243-3093

J.T. Posey Co.
Arcadia, CA
800/423-4292

Posture Support Mfg., Inc.
Solon, OH
800/321-6870

J.A. Preston Co.
Clifton, NJ
800/631-7277
800/221-2425

The Procter & Gamble Co.
Cincinnati, OH
800/543-0400
800/582-0313 OH only

Professional Medical Products, Inc.
Greenwood, SC
800/845-4560

Pryor Products
Solana Beach, CA
800/854-2280

PyMaH Corp.
Somervilee, NJ
800/526-3538

Quadra
Westwood, CT
800/824-1068

Renal Systems, Inc.
Minneapolis, MN
800/328-3324

Respironics, Inc.
Monroeville, PA
800/245-2767

Rockford Medical & Safety Co.
Rockford, IL
800/435-9451
800/892-9435 IL only

ROHO Research & Development, Inc.
East St. Louis, IL
800/851-3449

Rolyan Medical Products
Menomonee Falls, WI
800/558-8633

Murray Salk, Inc.
Allston, MA
800/343-4497

Salter Labs
Arvin, CA
800/235-4203

Salton Inc.
Bronx, NY
800/221-8794

Schuco
div. American Caduceus Industries
Williston Park, NJ
800/645-2500

Science Products
(formerly Science for the Blind Products)
Southeastern, PA
800/233-3121
800/222-2148 (PA only)

Sci-o-Tech
Lancaster, PA
800/233-0291

Shugarman Surgical Supply
Toledo, OH
800/537-8918

Sickroom Service, Inc.
Milwaukee, WI
800/558-7130

Skill Development Equipment Co.
Anaheim, CA
800/854-6085

Smith & Davis Mfg. Co.
St. Louis, MO
800/325-9512

Solo
see Mobility Plus

Spenco Medical Corp.
Waco, TX
800/433-3334

St. Louis Ostomy & Medical Supply
St. Louis, MO
800/325-0979

Stand Aid of Iowa, Inc.
Sheldon, IA
800/831-8580

Staodynamics, Inc.
Longmont, CO
800/525-2114

Stryker Corp.
Kalamazoo, MI
800/253-3210

Sween Corp.
Lake Crystal, MN
800/533-0464

Temco Healthcare Industries, Inc.
Passaic, NJ
800/831-0170

Texas Instruments
800/858-1802

Theradyne Corporation
Lakeville, MN
800/328-4014

Thompson-Blair
St. Louis, MO
800/325-0877

Timeter Instrument Corp.
Lancaster, PA
800/233-0258

Toce Brothers Mfg., Ltd.
Broussard, LA
800/842-8158

Tubular Fabricators Industry, Inc.
Passaic, NJ
800/526-0178

Ulster Scientific, Inc.
Highland, NY
800/431-8233

Uni-Patch, Inc.
Wabasha MN
800/328-9454

Union Carbide Medical Products & Distribution Center
Memphis, TN
800/238-5055

Urocare Products, Inc.
South El Monte, CA
800/423-4441

Vacumed, Inc.
Ventura, CA
800/235-3333

Veratex Corporation
Troy, MI
800/521-2470

Vix Breathing Equipment
Jamestown, CA
209/984-5212 collect

Western Enterprises
Avon Lake, OH
800/321-4148

Whitestone Products
Piscataway, NJ
800/526-3567

Wright & Filippis, Inc.
Drayton Plains, MI
800/482-0222 MI only

The National Heath Information Clearinghouse publication "Healthfinder" lists toll-free numbers for health information. Some of the numbers which may be relevant to products for disabled people include:

Alzheimer's Disease and Related Disorders Assn.
800/621-0379
800/572-6037 IL only

Cancer Information Service (CIS)
800/4-CANCER

Children's Defense Fund
800/424-9602
202/483-1470 Washington, DC only

Shriners Hospital Referral Line
800/237-5055
800/282-9161 FL only

National Down Syndrome Society Hotline
800/221-4602
212/764-3070 NY only

Epilepy Information Line
800/426-0660
206/323-8174 WA only

Library of Congress National Library Services for the Blind and Physically Handicapped
800/424-8567
202/287-5100 Washington, DC only

National Health Information Clearinghouse
800/336-4797
Provides an information and referral service designed to bring together consumers and health information resources. A service of the Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services.

National Hearing Aid Helpline
800/521-5247
313/478-2610 MI only
Provides information on hearing aids and distributes a directory of hearing aid specialists certified by the National Hearing Aid Society.

Hill-Burton Hospital Free Care Program
800/638-0742
800/492-0359 MD only
Provides information on hospitals participating in the Hill-Burton Hospital Free Care Program.

Federal Internal Revenue Service for TDD Users
800/428-4732
800/382-4059 IN only
Answers questions on Federal income tax, including questions on medical deductions for the cost of telecommunications devices for the deaf (TDDs), hearing aids, trained hearing-ear dogs, and sending deaf children to special schools. Accepts orders for the free publication "Tax Information for Handicapped and Disabled Individuals" and other free IRS publications.

Medicare/Medicaid Complaint Line
800/368-5779
202/472-4222 Washington, DC area
Handles complaints regarding the fraud, waste and abuse of Medicare and Medicaid. Assists people who have been overbilled for services or billed for services not rendered.

Practitioner Reporting System
800/638-6725
Offers a service for health professionals to report problems with drugs or medical devices. A service of the Food and Drug Administration, U.S. Department of Health and Human Services.

Consumer Product Safety Commission
800/638-CPSC
Answers questions and provides free material on different aspects of consumer product safety, including product hazards, product defects, and injuries sustained as a result of using products.

Spina Bifida Information and Referral
800/621-3141

CONSUMER PROTECTION

BUYER BEWARE -- SHOPPING FOR ADAPTIVE DEVICES

"Technology advances in recent years have created a multitude of aids for disabled people -- aids that have opened up doors of employment and independence. But these aid are expensive, and sometimes have 'bugs which have not been ferreted out. Individuals and agency representatives need to exercise caution when purchasing expensive, new equipment.

Will It Solve the Problem? "Before deciding on a particular device, make sure it will solve the problem. Identify the tasks the equipment will solve and then thoroughly question vendors to assure that their device can handle those tasks....

...Get Promises in Writing "Before committing several thousand dollars to a particular vendor, insist on a demonstration. Do not buy a piece of equipment based on a brochure. If an aid appears suitable, but a demonstration isn't possible, make sure the device can be returned with a full refund. Any reputable vendor will agree to this, but get the agreement in writing.... A verbal promise of a device's availability and capabilities, or the vendor's responsibilities, is no promise. Always save correspondence, letters of agreement and technical information.

Service and Reliability "When considering any device, check it out for service and reliability. Ask to talk to satisfied customers using the equipment in a similar application. If a vendor is unwilling to supply customer references, there may be a good (or bad) reason. Find out the cost of a yearly service contract versus the cost of a typical repair bill for the aid. What is the turnaround time for service? If there is not good, timely service available, reconsider the device, particularly if it's needed every day for a job.

Solving Interface Problems "Find out what kind of technical support is available for solving interface problems. Interface problems are the most important issues in the effective use of braille and audio terminals. Make sure that support is available from the vendor, your company or an outside organization.

Proper Training "Finally, when considering a complex device, find out what training is available and how much it costs. To purchase a device like an electronic braille system, or an audio terminal, without training will usually prove disappointing because of the struggles to learn how to use it. Beside's the vendor's technical support, if available, look to user groups; they can be a great source of help when problems arise or new applications are uncovered."

from "Sensory Aids Technology Update", January, 1984. Published by the Sensory Aids Foundation, 399 Sheridan, Palo Alto, CA.

STEPS TO FOLLOW IF YOU HAVE PROBLEMS WITH YOUR ASSISTIVE DEVICE

"Read the instructions and your warranty carefully. If you have not received a copy of a warranty with your device, write to the manufacturer or seller and ask if your device is warranted. Be sure that you don't expect features or performance your device isn't designed to give or expect warranty coverage that was never promised.

"Contact the warrantor. The seller may not be the warrantor. Write or call the company at the address given in the warranty. Describe your problem and explain exactly what you think the company owes you under the warranty -- repair, refund, or replacement. When you call a company, send a follow-up letter to put in writing what was said. Send all letters by certified mail and keep copies. But remember: having a warranty doesn't mean you automatically get your money back. If a product is defective, the company is entitled to try to fix it.

"If the company is not helpful, contact a state or local consumer protection office or complaint center. At present, agencies handling problems of the disabled are not accustomed to giving warranty information or resolving warranty problems, but your state consumer protection office or complaint handling center routinely helps people solve warranty problems and gives warranty information.

"If contacting a consumer protection office doesn't resolve the problem and the amount of money involved is small, you can go to a small claims court. The costs are low, procedures are simple, and lawyers are usually not needed. The clerk of the small claims court can tell you how to bring your lawsuit.

"If your device has a written warranty and was manufactured after July 4, 1975, you may want to sue the company under the Warranty Act. You should contact a lawyer or consumer protection office for information. If you win, you can get money damages or any other type of relief the courts choose to give you. This includes the cost of bringing the lawsuit and your attorney's fees. If your device was manufactured before July 4, 1975, you can only sue the company under state law; in California, all assistive devices come with a written warranty which enables you to sue under state and federal law.

"Report violations of the law to the Federal Trade Commission, Warranties, Washington, DC 20580. The FTC cannot help you directly with a warranty problem, but it needs to know if companies are obeying the warranty law. Write the FTC if a company does not make warranty information available, does not label the warranty as required, or does not perform service as promised. While the FTC does not handle individual cases, it does look into business practices which affect many consumers."

from "Warranties Can Save You Time and Money," by Jacqueline Schmitt, Federal Trade Commission. Reprinted with permission from the Spring, 1981 issue of Accent on Living.

PUBLICATIONS WHICH PROVIDE AN OVERVIEW OF TECHNOLOGY FOR DISABLED PEOPLE

Some publications cover a broad spectrum of technology applications. To avoid listing these books over and over in each section of the Resource Guide, this general book list is included for your use.

DISABILITY BOOKS WHICH HAVE USEFUL INFORMATION ON DEVICES

Disability and Rehabilitation Handbook, Robert M. Goldenson, editor. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020. 846 pages. $27.50. 1978. The book is organized in four parts. Part I, Foundations of Rehabilitation, explores the practical approaches to aiding the disabled, such as the role of the family, the development of social and sexual relationships, arrangements for independent living, housing and transportation adaptations, employment possibilities, educational and recreational programs, legal rights, and financial assistance. Part II, Disabling Disorders, covers all the major handicapping diseases and defects. Part 3 comprises Illustrative Cases. Part 4 is the Data Bank, an extensive compilation of statistics, names and addresses of relevant national organizations, federal agencies and programs, periodicals and directories, and major sources of information and supplies. Chapter 5, "Independent Living: Ways and Means," Describes the broad range of devices available, within the context of independent living.

Disabled? Yes. Defeated? No. K. Cruzic. Prentice-Hall, Englewood Cliffs, NY 07632. 211 pages. 1982. Contains information resources for disabled persons, their families, and therapists. Chapters discuss daily living aids, clothing, housekeeping, and cooking, as well as educational programs, recreation, finances, careers, and community services.

Resource Guide to Literature on Barrier-Free Environments with Selected Annotations 1980. Prepared by Architectural and Transportation Barriers Compliance Board, Washington, DC 20202. (A&TBCB) 79-00004. Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. 279 pages. Lists access information for schools, parks and recreation, transportation and housing. Also contains a section on Aids and Devices.

The Source Book for the Disabled: An Illustrated Guide for Easier and More Independent Living for Physically Disabled People, Their Families, and Friends, Gloryа Hale, Ed. Paddington Press, 95 Madison Avenue, New York, NY 10016. 288 pages, illustrations. $15.95 cloth; $14.95 paper. 1979. Consumer-oriented, comprehensive guide to independent living. Includes discussions of equipment, accessibility, home adaptations, personal care, leisure, recreation, sexuality, and disabled parenting.

SELECTED PUBLICATIONS SPECIFICALLY ON TECHNOLOGY

Aids to Independent Living: Self-Help for the Handicapped, Edward Lowman and Judith L. Klinger. McGraw-Hill, 330 42nd Street, New York, NY 10036. 796 pages, many illust., bibliography. $41.00. Out of print, but available in rehab departments.

Aids to Make You Able: Self-Help Devices and Ideas for the Disabled, Wendy M. Davis. Beaufort Brooks, 9 E. 40th Street, New York, NY 10016. 81 pages. $8.95. 1981. The occupational therapist who compiled this book compares assistive devices to recipes: "You learn a few basic ones, invent your own, and...try those of other people." Her informative book presents self-care aids to help disabled people resume activities of daily living and encourages others to invent new equipment. Illustrated with simple drawings, the aids are grouped into nine categories: communication, eating and drinking, dressing, bathroom aids, household aids, transportation, leisure and pleasure, sexuality, and smoking. A concluding section contains sources for additional information on specific topics, a bibliography, and addresses of medical suppliers.

The Best of Helpful Hints, Courage Center Auxiliary. Courage Center, 3915 Golden Valley Road, Golden Valley, MN 55422. 86 pages. $3.50.

An Easier Way: Handbook for the Elderly and Handicapped, Jean Vieth Sargent. Iowa State University Press, Ames, IA 50010. 220 pages. $10.50. 1981. Simple equipment that can be readily made or bought to help meet daily living needs.

Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, England. 1973-1980. 10-booklet series which provides guidelines to help in the selection of equipment: "Personal Care," "Home Management," "Disabled Mother," "Clothing and Dressing for Adults," "Housing and Furniture," "Hoists and Walking Aids," "Wheelchairs," "Outdoor Transport," "Communication," "Leisure and Gardening," and "Disabled Child." Pictures of commercially available and do-it-yourself aids.

Functional Aids for the Multiply Handicapped, I.P. Robinault, Editor. Harper & Row, Hagerstown, MD. Prepared under the auspices of the United Cerebral Palsy Associations, Inc., this book discusses where to buy or how to construct items that would enable a multiply handicapped person to function more independently. Aids are classified according to function: transfer, travel and mobility; personal care, including feeding and eating equipment, clothing and dressing aids, and personal hygiene aids; communication and learning; and recreation. Includes a list of resources for aids and information.

A Handbook of Ideas for the Disabled: Ideas and Inventions for Easier Living, Suzanne Lunt. Charles Scribner's Sons, New York, NY. 276 pages. $17.95. This handbook has hundreds of devices and ideas to make life easier and more active. You'll find directions for simple homemade aids as well

as information on equipment available on the market; devices that help you sit up, get out of bed, dress, walk, handle household chores, travel, cook -- do anything more easily than you thought possible. Written by a layperson for the general reader, the book's aim is to tell you what is available rather than persuade you to buy anything. The final section of the book helps you deal with the cost of equipment and medical help. You'll find suggestions and the names of organizations that will help you obtain jobs, government money, home care, tax breaks, and other assistance. The appendix, "Sources of Equipment and Information," provides a complete directory of the suppliers mentioned throughout the book and helpful organizations. This book was inspired by the needs of the author's terminally ill mother, who was nursed at home, and the information's practicality reflects that fact.

Helping the Handicapped: A Guide to Aids Developed by the Telephone Pioneers of America. Telephone Pioneers of America, 195 Broadway, New York, NY. For availability, call your local phone company in the U.S. or Canada for the name of the local chapter administrator.

This book probably represents only a small percentage of the devices that the Pioneer group has developed. These are the ones that were documented.

Groups of Pioneer volunteers serve the people of their communities in innumerable ways, but this book is dedicated to the hundreds of Pioneers and Future Pioneers who have used their ingenuity, their know-how, and countless hours of volunteer time to develop and build aids to help their handicapped neighbors.

This handbook is not a catalog of aids and devices for sale. In many cases the items described are available only in the area where the chapter listed under "CONTACT" operates. However, "how to make it" information (drawings, diagrams, parts lists, etc.) is available from these chapters. We suggest that anyone who needs a particular device shown in the book contact first the Administrator of the local Pioneer chapter to inquire whether one can be made available locally. A list of headquarters locations of each chapter, by state, is included. The Administrator can be reached by calling the telephone company headquarters in the city indicated and asking for the chapter by name.

With a few exceptions, the amount shown under the "COST" heading is not a selling price. It is the approximate cost of the materials required to build the device. Most aids built by Telephone Pioneers are donated to local schools, hospitals or agencies which serve handicapped people.

Technology for Independent Living. Proceedings of the 1980 Workshops on Science and Technology for the Handicapped, Virginia Stern and Martha Redden, editors. American Association for the Advancement of Science, 1776 Massachusetts Ave. NW, Washington, DC 20036. 262 pages. 1982.

Technology for Independent Living II: Issues in Technology for Daily Living, Education and Employment. Project on the Handicapped in Science. Virginia Stern and Martha Redden, editors. American Association for the Advancement of Science, 1776 Massachusetts Avenue NW, Washington, DC 20036. 1983.

PRODUCT DIRECTORIES

Accent on Living Buyer's Guide, (1984-85 ed). Accent Special Publications, P.O. Box 700, Bloomington, IL 61701. 1983. Manufacturers and distributors of equipment listed by category, as well as addresses of national organizations and associations concerned with disabilities. Published annually.

Catalog of Aids for the Disabled. Nancy Kreisler and Jack Kreisler. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 16020. 246 pages. $24.95. 1982. Over 600 separate pieces of equipment are described in this text, listing the latest in equipment needs from the kitchen to your automobile, from children to adults, for all manner of disabilities. Each equipment entry includes a photograph if deemed necessary, a brief description, a price category, and the name of a supplier; the appendix then lists the addresses of all suppliers, addresses of helpful organizations, and periodicals that might be useful.

Design for Accessibility: Equipment and Aids Catalog. (The 1979 edition was Barrier Free Design Equipment and Aids Catalog.) Michigan Center for a Barrier Free Environment, West Blomfield, MI. 1981. Guide to equipment and aids available to help create a barrier-free environment. Includes standing aids, aids for the blind, auto or van adaptations, building equipment, doors, floor surfaces, kitchen and laundry, plumbing accessories, windows, and other special equipment. This is not a commercial catalog; you can't buy things from it.

Product Inventory of Hardware, Equipment and Appliances for Barrier Free Housing Design. National Handicap Housing Institute, Inc., 12 S. 6th Street, Suite 1216, Minneapolis, MN 55402. $25.00. 1979. Catalog with 418 pages provides descriptive summaries, prices and pictures of approximately 200 products. It includes products in general use as well as those specifically designed for disabled persons.

NOTE: The Green Pages, and Rehabilitation Purchasing Guide (RPG) which replaced it, are no longer being produced.

A DIFFERENT APPROACH TO ASSISTIVE DEVICES

The Comfortably Yours catalog isn't your typical rehab products catalog. It distributes "Aids for Easier Living" and does not specifically focus on the handicapped/health care audience. It's a mass market catalog for "just folks." About half the products are clever convenience products. The other half are the kinds of things we'd expect to see in a clinical catalog -- bathtub benches, tub safety bars, reachers, an adult bib, eating aids, etc.

What makes this catalog fun to read is how the products are described. It's hard to remember that there is a difference between the "rehab" products, and all the other gadgets that their copy writer has you so eager to buy. (Is there really a difference?) I personally find the catalog somewhat dangerous -- I have to exert real self-control not to buy something from almost every page.

We can all learn from the catalog's marketing approach. It could teach us how to talk about technology for people with physical limitations in a way that doesn't intimidate or alienate the people who need them. It provides a way for people to think about their equipment as "aids for easier living" rather than stigmatizing signs of being "crippled" or weak.

Comfortably Yours, Aids for Easier Living, 52 West Hunter Avenue, Maywood, NJ 07607, 201/368-0400.

Some examples of the Comfortably Your's product descriptions:

"How many times in the middle of the night do you have to put the light on? You fumble under the shade for the switch, hoping you won't knock something over, turn on the light -- and blind yourself! THis lamp dimmer is actually for any room, but I want you to put it by the bed. It glows in the dark. All you do is open one eye just a little bit, push down on the glowing knob, and the light is on -- as soft as you like. This is great, too, for a sick room, for children, or for anyone who has trouble moving about and can't turn knobs. UL listed. 5 foot cord.

"A few years ago my mother stopped using fitted sheets, even though she preferred them, because her arthritic hands hurt whenever she pulled at the tight corners. We found these cotton terry sheets in Europe and brought them back for her. She was thrilled. They have fitted elasticized corners and, because the terry material has a natural stretch, there is no strain when putting them on the bed. These long wearing quality sheets absorb perspiration, feel comfortable year round, and machine was and dry beautifully. Available in champagne and blue, please specify color. P.S. Mom, who wastes nothing, now uses her old flat bottom sheets as top sheets.

"Being able to take care of yourself by yourself is a wonderful thing -- especially when it comes to bathing and personal hygiene. The new open-front design of this chair allows you to cleanse more effectively and independently. You can reach more areas, even while seated. The open design also allows you to place your foot directly behind you as you get in and out of the bath, giving you an extra measure of safety. The molded seat is contoured for comfort and the legs adjust in height easily by push button from 14 1/2" to 22" and have non-slip rubber tips. The chair is corrosive resistant and is also available without a back. A special chair for special needs with features well worth the cost.

We received this good-looking eating smock in the mail recently. The lady who sent it to us says she designed it for her father who needs it to protect his clothing while eating but wouldn't dream of wearing a bib. She chose this up-to-date blue denim fabric and styled it so that it goes on easily and stays on securely with ties in the back. He accepted it so readily that she felt others might prefer it too. The terry front has a waterproof backing and a generous pocket across the front to catch food crumbs. It measures 21 1/2" across the front and is machine washable and dryable. One size fits all.

SOURCES OF CURRENT INFORMATION

Trade and consumer magazines offer one of the most timely means for learning about new equipment availability. Scanning periodicals on a regular basis can be an effective means to acquire product information and remain generally aware of equipment and service availability.

Each of the periodicals listed below regularly features a section devoted to new products/ideas. Each item entry in the periodical generally includes a description and picture of the device.

Accent on Living
"New Products and Services"
Cheever Publishing Company
Gillum and High Drive
P.O. Box 700
Bloomington, IL 61701

Communication Outlook
"News on Aids"
Artificial Language Laboratory
Computer Science Department
Michigan State University
East Lansing, MI 48824

The Coordinator
"New Products"
Coordinator Publications, Inc
11417 Vanowen Street
North Hollywood, CA 91605

Homecare/Rehab Product New
Miramar Publishing Company
2048 Corner Avenue
Los Angeles, CA 90025

ICTA Inform
"Technical Aids"
Swedish Institute for the Handicapped
Box 303
S-161 26 BROMMA
Sweden

Medical Device & Diagnostic Industry
"New Products"
Canon Communications, Inc.
2422 Wilshire Blvd.
Santa Monica, CA 90403

Paraplegia News
"Innovations"
5201 N. 19th Avenue, Suite 111
Phoenix, AZ 85015

Rehabilitation Digest
"Let's Get Technical"
Canadian Rehabilitation Council for the Disabled
One Younge Street, Suite 2110
Toronto, Ontario M5E 1E5
Canada

Rehabilitation Literature
"New Products"
National Easter Seal Society
2023 W. Ogden Avenue
Chicago, IL 60612

Rehabilitation Technology Review
"Left To Our Own Devices"
Rehabilitation Engineering Society of North America
Suite 402
4405 East-West Highway
Bethesda, MD 20814

RX Home Care
"Product Gallery"
"Equipment Spotlight"
Barrington Publications, Inc.
825 S. Barrington Avenue
Los Angeles, CA 90049

Sports 'N' Spokes
"Nifty New Stuff"
5201 N. 19th Avenue, Suite 111
Phoenix, AZ 85015

These journals also periodically have technology-related information.

Bulletins on Science and Technology for the Handicapped
American Association for the Advancement of Science
Office of Opportunities in Science
1776 Massachusetts Avenue NW
Washington, DC 20036
No subscription charge.
Quarterly.

Journal of the Association of the Severely Handicapped
The Association for the Severely Handicapped
7010 Roosevelt Way, NE
Seattle, WA 98115

Rehab Brief
National Institute of Handicapped Research
Office of Special Education and Rehab Services
Department of Education
Washington, DC 20201

Rehabilitation Gazette
Gazette International Networking Institute
4502 Maryland Avenue
St. Louis, MO 63108
Annual.
Back issues, $8 each
Volume 25, $10.

Rehabilitation Literature
National Easter Seal Society
2023 W. Ogden Avenue
Chicago, IL 60612
Bi-monthly. $21.
Two of the six issues in 1983 were technology related: "Technology & Disability," March-April 1983 (44, 3-4) and "Technology & Disability II," November-December 1983 (44, 11-12).

Rehabilitation World
Rehabilitation International USA
1123 Broadway
New York, NY 10010

Report and Access Information Bulletin
National Center for a Barrier Free Environment
1140 Connecticut Avenue NW
Suite 1006
Washington, DC 20036
Subscription $25.00/year
Bimonthly

AUDIOVISUALS

Approach to Independence: Functional Adaptations, James Mueller. Available from: Rehabilitation Research and Training Center, The George Washington University, 2300 Eye Street NW, Suite 714, Washington, DC 20037. 3/4" color videocassette, 33 minutes. 1978. Illustrates simple solutions to functional problems of the severely disabled that can be found through imaginative adaptations of common materials and products.

Assistive Devices for the Rehabilitation Patient. Rehabilitation Institute of Chicago, Education and Training Center, 345 East Superior St., Chicago, IL 60611. Videotape, 30 minutes. Presentation discusses and demonstrates common adaptive equipment used in dressing, feeding, grooming, avocation, and wheelchairs, as well as the carry-over of the use of adapted devices from a rehabilitation setting to an acute setting.

Devices for Self-Help Performance. Bureau of Education for the Handicapped. Available from: National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington, DC 20409. 16mm color film, 18 minutes. Illustrates the problems of persons with multiple physical handicaps and demonstrates supportive devices for task performance. Includes moving from place to place, sitting, standing, writing, turning pages, communicating and eating.

It's A New Day, Fern Field. South Bay Mayors' Committee for Employment of the Handicapped, 2409 N. Sepulveda Blvd. #202, Manhatten Beach, CA 90266. 16 mm color film, 9 minutes. 1981. Celebration of new attitudes and new technologies available to disabled people to increase their integration into the mainstream of life. Shows braille menu, elevating wheelchair, talking calculator, Opticon, and so on.

One Giant Step, Michael McFarland. Canadian Rehabilitation Council for the Disabled, Suite 2110, One Younge Street, Toronto, Ontario M5E 1E5, Canada. 16 mm color film, 40 minutes. 1981. Demonstrates the range of technical aids available, from environmental control systems to communications aids, showing how they can be used in various settings to increase independence and mobility of disabled people. First Prize, Technical Aids, 1981 International Rehabilitation Film Festival.

To Find Answers. United States Social Rehabilitation Services. Available from: National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington, DC 20409. 16 mm color film, 29 minutes. Discusses research for the handicapped. Demonstrates several devices to illustrate how science is improving life for the disabled.

NATIONAL ORGANIZATIONS

These groups can provide more information on technical aids; write for their publication lists.

Muscular Dystrophy Association
810 Seventh Avenue
New York, NY 10019

National Easter Seal Society for Crippled Children and Adults
2023 W. Ogden Avenue
Chicago, IL 60612
Easter Seals produces several excellent publication bibliographies on all phases of rehabilitation.

United Cerebral Palsy Association
66 E. 34th Street
New York, NY 10016
212/481-6300

Sister Kenny Institute
Division of Abbott-Northwestern Hospital
800 E. 28th at Chicago Avenue
Minneapolis, MN 55407
612/874-4149
Publishes a variety of materials for the disabled. Books about aids and equipment include: Communication Aids for the Brain Damaged Adult, Introduction to Bowel and Bladder Care, Living Comfortably with Your Ileostomy, and Wheelchair Selection: More Than Choosing a Chair with Wheels. "Equipment" and "Some Adaptive Devices" are audiovisuals available from the Institute.

DISABILITY SPECIFIC PUBLICATIONS

Many books written about specific disabilities have chapters and/or extensive references to technical aids. Some examples include:

ARTHRITIS

Aids and Adaptations (2nd Edition). K.P. MacBain, editor. The Canadian Arthritis and Rheumatism Society, 1976. Describes items which have been used successfully by patients in an occupational therapy department. Part I contains drawings and instructions for self-help aids; Part II covers environmental adaptations. Bathing, toileting, homemaking and ambulation or transfer are emphasized.

Rheumatic Disease: Occupational Therapy & Rehabilitation. Chapter 27: "Assistive Devices". Second edition. J. Melvin, editor. F.A. Davis Co., Philadelphia, PA.

"Self-Help Manual for Patients With Arthritis." Prepared by the Arthritis Health Professions, Section of the Arthritis Foundation, 1315 Spring Street NW, Atlanta, GA 30309. May be obtained from local chapters of the Foundation. 1980.

CEREBRAL PALSY

Functional Aids for the Multiply Handicapped. Isabel P. Robinault, Editor. Medical Department, Harper & Row Publishers, Hagerstown, MD. 1973. $3.50 paperbound edition printed for and available only through: United Cerebral Palsy Association, Inc., 66 East 34th Street, New York, NY 10016. A revised second edition is to be available soon.

Handling the Young Cerebral Palsied Children at Home. N.R. Finnie. E.P. Dutton, New York, NY. $5.95. 1975. This book is a classic. It provides information on home management of children with cerebral palsy for parents, teachers and therapists. Contains suggestions on do-it-yourself devices as well as commercially available equipment, particularly mobility aids. Also includes lists of resources for equipment and accessories.

Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages. E.C. High. George Washington University, Job Development Laboratory, Washington, DC. (NARIC Call No. 0102). 1977. Contains resources for aids, equipment, techniques and programs to help people with cerebral palsy. Lists print and nonprint material about cerebral palsy. The guide is divided into sections covering general information, positioning and seating, feeding, dressing, hygiene, and household and community involvement. Lists suppliers of aids and equipment, and publishers. Illustrated.

Treatment of Cerebral Palsy and Motor Delay, Second Edition. Sophie Levitt. Blackwell Scientific Publications, Ltd., 52 Beacon Street, Boston, MA 02108. $21.95. A practical and comprehensive guide on the handling, understanding, and treatment of the cerebral palsied child and the child with developmental motor delay. Methods of treatment are suggested, but special emphasis is given to the underlying principles involved. The second edition has been widely revised, with new material added on the visually handicapped child, behavioral therapy for movement, the development of play, feeding techniques, the clumsy child, and equipment.

DISABLED CHILDREN

Aids for Children. International Committee on Technical Aids, Housing and Transportation (ICTA), Information Centre, S-161 03, Bromma 3, Sweden. 1972. An international catalog of children's assistive devices.

Caring for Your Disabled Child. Benjamin Spock and Marion O. Lerrigo. Collier MacMillan International, Inc., 866 Third Avenue, New York, NY 10022. $1.95. 1965. Part VII, Tools and Techniques for Daily Living, has information on self-help aids, crutches, braces, wheelchairs, etc.

Disabled Child. Book 9 in the series: Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, England. One of a 10 booklet series which provides guidelines to help in the selection of equipment. Lists and describes, with photographs, equipment to aid in the care of disabled children and to increase their independence. Covers categories such as home design, mobility, wheelchairs, personal hygiene, feeding and dressing. Includes reference and resource lists. Pictures of commercially available and do-it-yourself aids.

Easy to Make Aids for Your Handicapped Child - A Guide for Parents and Teachers. Don Caston. A Spectrum Book, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632. Revised American edition 1982. $6.95. A clear description of a variety of aids that a parent could build for his child; aids can be made for the child's specific needs, and are much cheaper and sometimes more appropriate than commercially produced aids. Simple plans for building more than 60 multipurpose aids.

Environmental Design for Handicapped Children. J.S. Sandhu and H. Hendricks-Jansen. Gower Publishing Co., Old Post Road, Brookfield, Vermont 05036. 1976.

Environments for All Children. Access Information Bulletin. National Center for a Barrier Free Environment, Suite 1006, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036. This bulletin summarizes some of the accessibility issues that include all children, regardless of their disabilities.

Functional Aids for the Multiply Handicapped. Isabel P. Robinault, Editor. Medical Department, Harper & Row Publishers, Hagerstown, Maryland. 1973. The $3.50 paper cover edition printed for and made available only through United Cerebral

Palsy Association, Inc., 66 East 34th Street, New York, NY 10016. A revised second edition is to be available soon.

Handling the Young Cerebral Palsied Child at Home. N. R. Finnie. E.P. Dutton, New York, NY. $5.95. 1975. Equipment suggestions are made throughout the book for commercially available and do-it-yourself devices. Also, a list of resources for equipment and accessories is included.

Handicapped Children – Strategies for Improving Services. Gary Breuer and James Kakalik. McGraw-Hill, 1221 Avenue of Americas, New York, NY 10020. 1979.

Handi-Sitters: How to Sit for the Handicapped. M. Cohn and K. Caffey. Available from: Melissa Cohn, OTR, 1812 Mapleleaf Blvd., Oldsmar, Florida 33557. 63 pages. 1979. Chapter 4: Special Equipment. Introduction to special apparatus a caregiver needs to understand; simple sketches and reasons for use. A companion teaching manual is also available.

Helping the Severely Handicapped Child: A Guide for Parents and Teachers. P.B. Doyle, J.F. Goodman, G.N. Jeffrey, and Lester Mann. Thomas Y. Crowell, Publishers. 10 East 53rd Street, New York, NY 10022. 1979. This book will help parents, teachers, and others responsible for the care of children with severe physical and mental impairments to obtain the best public education available and assist in solving specific problems, including the handling of daily at-home activities. Chapter on Special Equipment, pp 93-108.

Home Care for the Chronically Ill or Disabled Child: A Manual and Sourcebook for Parents and Professionals. Monica Loose Jones. To be published by Harper & Row, January 1985. Several chapters focus on uses of assistive devices: Positioning Your Child: Beds, Wheelchairs and Orthopedic Equipment; Exercises and Orthopedic Appliances; Vision, Hearing, and Communication Problems; Bathing, Toileting, and Personal Hygiene; How and in What to Dress Your Child; How and What to Feed Your Child.

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, Second Edition, and More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities. Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740. 50 pages. $5.00 plus $1.00 postage and handling. 1982. This book gives simple directions for constructing toys and switches that can be easily operated by severely and profoundly handicapped children. This book has a wide range of applications and should be useful to parents, teachers, specialists of vision, hearing, speech, physical and occupational therapists.

How to Build Special Furniture and Equipment for Handicapped Children. Ruth B. Hofman. Charles C. Thomas, Publisher, 1600 S. First Street, Springfield, IL 62717. 100 pp. $10.95. 1974. Explicit instructions including pictures, measurements and materials for making a standing board, a cut-out table, a standing table, chair inserts, a potty chair, etc.

Inexpensive Equipment for Activities of Daily Living. Kathryn S. Cservenyansky, C.O.T.A. Occupational Therapy Department, Job Development Laboratory, George Washington University Medical Center, 2300 Eye Street NW, Room 20, Washington, DC 20037. 18 pages. $1.00. 1973. Manual of easily made aids for feeding, dressing, hygiene.

Let Me Do-It-Yourself: A Curriculum Guide for Teaching Daily Living Skills to Orthopedically Handicapped Children. Joan McCollom. Available from: Albert Schweitzer School, 6991 Balboa Ave., San Diego, CA. Pub #1B785. 1978. Includes suggestion for assistive devices and a checklist for evaluation of daily living skills evaluation for school age and preschool children.

Occupational Therapy for Mentally Retarded Children, M. Copeland, L. Ford, and N. Solon. University Park Press, Baltimore, MD. 226 pp. 1976. Chapter 6, Adapted Equipment. Suggestions, sketches and construction details for low cost aids that can be constructed in the clinic, classroom or home.

Physically Handicapped Children: A Medical Atlas for Teachers. Eugene E. Bleck, M.D. and Donald A. Nagel, M.D. Grune & Straton, Inc., 111 5th Ave., New York, NY 10003. 2nd edition, 1982. Fundamental medical facts are accompanied by practical suggestions for teachers. Assistive devices are included where appropriate.

Please Help Us Help Ourselves. Inexpensive Adapted Equipment for the Handicapped. Carol Nathan, OTR. Available from: O.T. Program, Indiana University Medical Center, 1232 W. Michigan Street, Indianapolis, IN 46202. $2.00. Illustrates the fabrication of inexpensive adaptive equipment for disabled children.

Project PROJIMO: A Villager-run Rehabilitation Program for Disabled Children in Western Mexico. The Hesperian Foundation, Box 1692, Palo Alto, CA 94032.

Products for People with Vision Problems. American Foundation for the Blind, Consumer Products Department, 15 W. 16th Street, New York, NY 10011. Section on Preschool Products, as well as other devices used by children with vision problems.

Raising Your Hearing-Impaired Child: A Guide for Parents. Shirley McArthur. Alexander Graham Bell Association for the Deaf, 3417 Volta Place NW, Washington, DC 20007. 256 pages. $10.95. 1982.

Special Technology for Special Children. Paul Goldberg. University Park Press, 300 North Charles St., Baltimore, MD 21201. 1979. Computers to serve communication and in education of both cerebral palsy and hearing impaired children.

Specially Adapted and Individually Made Hearing Aids for Children. International Commission on Technical Aids (ICTA). ICTA Information Center, Box 303, S-161-26, Bromma, Sweden. 1982.

Teaching Individuals with Physical and Multiple Disabilities. J.L. Bigge and P.A. O'Donnell. Charles E. Merrill, A Bell and Howell Company, Columbus, OH 43216. 279 pages. Assistive devices

are included, especially in the chapters on Academics; Severe Communication Problems and Self Care. Sketches and photographs are used to show device applications; advantages and disadvantages of equipment are listed.

Technical Aids for Handicapped Children. Rehabilitation Centre for Children, Winnipeg, Canada. A resource book of both commercially available and custom made equipment.

Additional Sources of Information for Parents of Disabled Children

The following associations and agencies are among many that provide resources. Write for a list of their publications.

American Academy of Pediatrics
P.O. Box 1034
Evanston, IL 60204

American Medical Association
Bureau of Health Education
525 N. Dearborn Street
Chicago, IL 60610

The Association for the Severely Handicapped
7010 Roosevelt Way, NE
Seattle, WA 98115

Council for Exceptional Children
1920 Association Drive
Reston, VA 22091

Library of Congress, Division for the Blind and Physically Handicapped
1921 Taylor Street NW
Washington, DC 20542

National Congress of Parents and Teachers
700 N. Rush Street
Chicago, IL 60611

National Foundation of Dentistry for the Handicapped
1726 Champa
Denver, CO 80202

National Information Center for Handicapped Children and Youth
155 Wilson Blvd.
Suite 600
Rosslyn, VA 22209

DISABLED ELDERLY

Easier Way: Handbook for the Elderly and Handicapped. Gean Sargent. Iowa State University Press, 2121 South State Avenue, Ames, IA 50010. 515/294-5280. 223 pages. $11.50. 1981. This book describes devices and adaptations both commercially available and homemade to help elderly disabled persons who want to remain as independent as possible. It is arranged by subjects such as cooking, cleaning, bathroom, dressing, grooming, relieving aches, sewing and handwork, and mobility. Related publications are listed.

A Handbook of Assistive Devices for the Handicapped Elderly: New Help for Independent Living Joseph Breuer. Haworth Press, 28 East 22nd Street, New York, NY 10010. 212/228-2800. 80 pages. $20.00. 1982. This illustrated book describes a broad array of devices designed to assist handicapped elderly persons. A major emphasis is given to devices to help the bedridden elderly with limited strength and mobility in performing activities of daily living. Devices are classified under such topics as sitting, communicating, dressing, eating, toileting, and walking. Each chapter has an accompanying bibliography.

LARYNGECTOMY

Aids and Devices for Laryngectomees. Speaking Devices for Laryngectomees. Supply Sources for Items Used by Laryngectomees. Available from: International Association of Laryngectomees, American Cancer Society, 777 Third Avenue, New York, NY 10017. 212/371-2900. The Association's Annual Directory includes local sources of supplies for the laryngectomee patient. Reprints and fact sheets include: Aids and Devices for Laryngectomees, Supply Sources for Items Used by Laryngectomees, and Speaking Devices for Laryngectomees.

MULTIPLE SCLEROSIS

"Aids to Ease the Activities of Daily Living," Chapter 8. K. Robbins and A. Abramson. In Multiple Sclerosis: A Guide for Patients and Their Families, Labe C. Scheinberg, M.D., editor. Raven Press, 1140 Avenue of the Americas, 1983.

ONE-HANDED

"Adapted Living Aids for a Bilateral Shoulder Disarticulation." M.A. Marker. American Journal of Occupational Therapy, #9, 584, 1977.

Handbook for One-Handers. A.L. Danzig. 3rd edition. Federation of the Handicapped, 211 West 14th Street, New York, NY 10011. $1.00. 1966. Description of a wide variety of actions involved in everyday living, with detailed advice to the one-handed person for easy performance.

The One-Hander's Book: A Basic Guide to Activities of Daily Living. Veronica Washam. Harper & Row Publishers, 10 E. 53rd Street, New York, NY 10022. Also available from: Independent Living Research Utilization Project, The Institute for Rehabilitation and Research, 1333 Moursund Avenue, Houston, TX 77030.

Single-Handed: Devices and Aids for One Handers and Sources of These Devices. Betty Garee, ed. Cheever Publications, P.O. Box 700, Bloomington, IL 61701. 25 pages, illustrations. $3.50. 1978. This book is primarily product-oriented; i.e., it lists devices which could be useful to a one-hander and the various sources of these devices.

OSTOMY

The Ostomy Book: Living Comfortably with Colostomies, Ileostomies, and Urostomies. Barbara Dorr Mullen and Kerry Anne McGinn. Bull Publishing Company, P.O. Box 208, Palo Alto, CA 94302. 236 pages, illustrations. $7.95. 1980.

United Ostomy Association, Inc., 2001 W. Beverly Blvd., Los Angeles, CA 90057, 213/413-5510. The Association provides a list of manufacturers and suppliers of equipment for the ostomy patient.

PARKINSON'S DISEASE

"Aids, Equipment, and Suggestions to Help the Patient with Parkinson's Disease in the Activities of Daily Living" (pamphlet). American Parkinson Disease Association, 147 East 50th Street, New York, NY 10022. 212/421-5890.

"Aids to Daily Living for the Patient with Parkinson's Disease." Alison Beattie. British Occupational Therapy Journal, February, 1981.

"Team Management of Parkinson's Disease." American Journal of Occupational Therapy, 31, 300-308. 1977.

STROKE

Do It Yourself Again: Self Help Devices for the Stroke Patient. American Heart Association, National Center, 7320 Greenville Avenue, Dallas, TX 75231. 45 pages. 1969. Practical aids for eating, dressing, reading, housework, using the bathroom and walking are described and illustrated. Suggestions for selection of a wheelchair and rearrangement of the home are provided.

"Handy, Helpful Hints for Independent Living after Stroke." Julius D. Lombardi, National Easter Seal Society, 2023 W. Ogden Avenue, Chicago, IL 60612. 15 pages. 40 cents plus 25 cents postage & handling. Rev. ed., 1980. Practical solutions to everyday problems -- eating, dressing, gardening, and other adaptive activities -- shared by the man who developed them.

Help Yourself: A Handbook for Hemiplegics and Their Families. Butterworth, Inc., 3700 Pearl Street, Washington, DC 20014. 1972.

"I'd Rather Do It Myself." N. Wall. Occupational Therapy Department, Massachusetts Rehabilitation Hospital, 125 Nashua Street, Boston, MA 02114. $2.00. A 12-page booklet containing descriptions and illustrations of devices and equipment.

Stroke Bibliography. Available from: National Easter Seal Society, 2023 West Ogden Ave, Chicago, IL 60612. Has information on books, pamphlets, reprints to read, catalogs to order.

FOR INFORMATION SPECIALISTS

Academic Library Facilities and Services for the Disabled. J.L. Thomas and C.H. Thomas. Oryx Press, 2214 North Central at Encanto. Phoenix, AZ 85004. $70.00.

Access Problems with Computer-Based Services. E.J. Desautels. University of Wisconsin, Department of Computer Sciences. Technical Report #516. 16 pages. $1.70. October, 1983. Available from Trace R&D Center, Reprint Service, 314 Waisman Center, 1500 Highland Ave., Madison WI 53705. Automated library catalogs which students interrogate through computer terminals are becoming commonplace. This report examines the situation at the University of Wisconsin-Madison campus, and analyzes the general computer access problem in libraries as it impacts upon severely handicapped students.

Information Services to Disabled Individuals. Drexel Library Quarterly, Drexel University, Philadelphia, PA. April 1980, Volume 16, no. 2. Available from NARIC, 4407 Eight Street NE, Washington, DC 20017. $6.00.

Library Aids. Gaylord Brothers, Inc., P.O. Box 4901, Syracuse, NY 13221, 800/448-6160. Some items include: study carrel; convenient height revolving displays for newspapers, magazines, paperbacks, records and cassettes; aids for partially sighted individuals, including free-standing desk and floor model high-intensity magnifying lamps.

Library Services for the Handicapped Adult. Carol H. Thomas and James L. Thomas, editors. The Oryx Press, 2214 North Central at Encanto, Phoenix, AZ 85004. 152 pages. $25.00. Part I of this multi-authored book presents a background overview and discussion of needs and approaches to preparing librarians in serving handicapped people. The bulk of the work is contained in Part II, which addresses programs and services to special populations. Part III reproduces a detailed resources listing, subdivided in various categories, such as books, articles, retrieval systems, equipment sources, and nonprint media.

The Mainstreamed Library. Barbara H. Baskin and Karen H. Harris, editors. American Library Association, 50 East Huron, Chicago, IL 60611. 293 pages. $35.00. 1983.

Meeting the Needs of the Handicapped: A Resource for Teachers and Librarians. C. Thomas and J. Thomas, editors. Oryx Press, 1980, Phoenix, Arizona.

That All May Read: Library Service for the Blind and Physically Handicapped. 518 pages. Free. Available from Publication and Media Section, National Library Service for the Blind and Physically Handicapped, Library of Congress, Washington DC 20542.

The Equipment Selection Process

THE EQUIPMENT SELECTION PROCESS 39

EQUIPMENT SELECTION PROCESS 39

EVALUATION FORMATS 42

GUIDELINES FOR INITIAL CLIENT INTERVIEWS (PROJECT THRESHOLD) 43
INDEPENDENT LIVING SKILLS CHECKLIST (CIL) 47

SELECTED PUBLICATIONS 53

DEVICE SELECTION, BASIC USE AND TRAINING 53

EQUIPMENT SELECTION PROCESS

Kathy Bowman, OTR/Project Threshold
Rehabilitation Engineering Center
Rancho Los Amigos Hospital
Downey, California

All of us who have been involved in the field of rehabilitation have heard "horror stories" of equipment problems -- devices that take forever to be built and then cannot be used by the client, custom duplication of design at many times the cost of a commercially available item, and clients who have one problem solved only to have the solution prevent them from functioning independently in another aspect of the task. And all of us have probably been involved in at least one case which became overwhelming in complexity of problems, number of personnel involved and questionable client use of the end product. Some of these situations may be unavoidable, but utilization of a systematized process for equipment selection can hopefully keep them to a minimum. Such a selection process should include a functional assessment of the client and determination of equipment needs utilizing appropriate personnel.

Importance of a Systematic Selection Process

What does a selection process accomplish? To begin with, a systematized approach specifically defines the problem in the context of other activities. A client may be referred for one item; say, for example, a means of getting paper into a typewriter. Upon further investigation of the problem, it may become clear which exact aspects of this activity are difficult, and why, in reference to the client's capabilities. This would certainly affect the type of equipment needed. In addition, it may be determined that the client's problem is affected by fatigue of having to first position the typewriter; or that, indeed, all aspects of desk activities are difficult for him. The original equipment request is dealt with not in a void, but in a context which may reveal other areas of investigation which are also needed to improve functioning.

A key focus of the selection process is utilization of a functional assessment of the client as a basis for determining equipment needs. Knowledge of diagnosis such as "spinal injury C-6 level" or "muscular dystrophy early stages" is helpful, but hardly adequate. The functional assessment is a thorough evaluation of the client's problem areas, compensatory methods and strongest assets in terms of physical and mental skills. This often includes muscle strength, active ranges, pain limitations, sensory abilities, visual skills including perception, coordination and cognitive abilities. The functional assessment goes a step further than information found in many medical charts of muscle grades and range degrees in that it is done in the context of activity. A description of what problems affect hand use, for example, and why it then makes it difficult to perform certain activities, is much more helpful than the degree of range in the joints of the fingers.

A selection process helps to ensure use of the simplest, most cost-effective solutions. With the vast array of commercial products on the market, and constant changes in technology, it is imperative that a means of search be utilized to avoid "re-inventing the wheel" with each case. Design and fabrication of custom equipment is time-consuming and costly, and assurance that it is indeed the only means of providing needed technology is essential in our budget-conscious society.

The client should be actively involved in the selection process. This not only ensures that the end product will actually be useful, but may serve as a learning experience for the client. Many are then able to extrapolate from this experience and apply problem solving to future situations, approach new obstacles in an organized manner and identify appropriate resources when equipment needs arise in the future.

Experience in using a selection process results in the accumulation of information which may be useful for future clients. The knowledge of means of solving a particular problem, the actual equipment design, and resources for obtaining devices grow with each case and become a rich resource for future clients, provided the information is organized and obtainable within a system.

Project Threshold: Implementation of a Selection Process

In order to discuss the application of a selection process in detail, I am going to describe the program I am most familiar with, Project Threshold. To begin with some background, Project Threshold is a client service delivery program designed to meet the needs of the severely disabled person who requires specialized assistance in performing daily life tasks. It was originally funded in 1976 by the California State Department of Rehabilitation. Following this initial Innovation and Expansion grant, a contract was awarded in 1978 which established Project Threshold as a block-funded vendor of services for the Department of Rehabilitation. Similar case service contracts have been awarded each year since 1978. In addition, as of July 1981, private clients may also be referred to Project Threshold on a fee-for-service basis.

Project Threshold's staff consists of a core team who are responsible for the coordination and follow-through of all cases. As part of the Rancho Los Amigos Rehabilitation Engineering Center, we have a supporting staff of engineers available for custom design and fabrication, and facilities of a prototype shop and electronics lab. The staffs of Rancho Los Amigos Hospital and Department of Rehabilitation Training and Evaluation Program are also available to lend their expertise as needed to augment the core staff abilities. Outside consultants, including occupational therapists, physical therapists, other allied health professionals, vendors and contractors, are utilized when appropriate. Community resources such as independent living centers and agencies related to specific disabilities are used

for resources and referrals.

A key factor in Project Threshold's utilization of a selection process is use of a case coordinator. While a team of personnel may actually be involved in providing services, one staff member is in charge of reviewing referral information, contacting the client and counselor, presenting the case for team discussion, coordinating the evaluation, researching solutions, and determining final recommendations. Having one person in this role lends itself to ensuring an organized approach to equipment selection and avoids duplication.

Another facet of the program which facilitates the selection process is use of a Model Home for equipment demonstration and use. As part of the REC, the Model Home houses the Rehabilitation Equipment Demonstration unit established under a grant from the National Institute of Handicapped Research. The Model Home is designed to look like a home, and is stocked with equipment and home modification examples in a realistic environment. The majority of equipment has been obtained primarily from manufacturers as a donation or on a loan basis for demonstration purposes. Certain other equipment has been obtained from the Veterans' Administration Prosthatic Center in conjunction with equipment evaluation programs. Several charitable organizations have also provided financial assistance. Several hundred inexpensive commercially available items, which have been purchased or donated, are used extensively in independent living evaluations. Use of the Model Home is invaluable in augmenting proper selection of equipment.

A final key of the Project Threshold's organization is resource material. Catalogues and brochures on commercially available equipment useful to the disabled have been collected from over 1,000 manufacturers and incorporated into a master cross-referenced file. In addition, equipment search is done through ABLEDATA, a computerized data base of rehabilitation products accessed through the National Rehabilitation Information Center. This product information is delivered through an information broker who is housed in the same facility as Project Threshold. It includes descriptions and evaluation comments from users as well as basic data on the product.

Steps in the Selection Process

The first step of the selection process which Project Threshold uses is receipt and review of the referral information by the case coordinator. The information required for referral includes basic data on the client such as age, diagnosis, medical background information, a statement of problem areas, and functional changes expected as a result of the evaluation. Appropriateness of the referral is determined; some cases are referred to outside facilities or community resources, where services required are less complex or more appropriate for a local resource.

The necessary background information is collected, and clarification or elaboration on any of these aspects is accomplished by verbal collaboration with the referring person, be it rehabilitation counselor, rehabilitation consultant for an insurance company, or allied health professional. For some private clients, referral may be solely the client himself.

The next step in the process is to interview the client. An in-depth interview, usually done by telephone, obtains information about the client's functional abilities and limitations, personal care schedule, use of attendants, current living situation, and use of adaptive behavior or equipment. All areas are covered utilizing an interview sheet, even if the referral specified only one area of need. Often problems are identified which were not included as a referral reason, but directly or indirectly affect the original problem.

Completion of the interview allows the case coordinator to identify the problems and set tentative goals. Gathering detailed information from the client prior to the actual evaluation allows formulation of a total picture of the client's needs in the context of his daily life style, and a beginning plan that will make the actual evaluation quality time.

The case is then presented by the case coordinator to a team meeting within one week of the interview. This meeting of the Project Threshold staff and the liaison person with the Department of Rehabilitation Training and Evaluation Unit is a problem-solving session. The goal for the evaluation, location (such as Model Home, client's home, or job site visit), need for specialized equipment, and personnel to be included are all determined. An occupational therapist is always included, as this profession makes up the majority of the Project Threshold staff. The need for early involvement of engineering personnel may be established, depending on the type of technology it appears will be needed. It is also determined if outside consultants such as a physical therapist should be brought in for the initial evaluation or at a later point. An agenda is prepared for the evaluation.

The staff member involved in the case then organizes and prepares for the evaluation. Scheduling is done with the client, counselor, and consultants, and appropriate equipment is obtained. When not available in the Model Home, manufacturers may be contacted to provide equipment on a trial or loan basis. In some cases, the initial evaluation must be done prior to determining possible equipment needs, so identification of equipment for trial may come at a later point.

Next the client is evaluated. Every attempt is made to include the referring person in the evaluation as well. Most evaluations take place in the Model Home, but home and job site visits are conducted when there is an identified need for that environment. The actual evaluation includes a functional assessment of the client, problem identification specifically through observation beyond the initial referral and interview, demonstration of alternate methods of performing activities, and equipment trials. Solutions may be apparent quickly as the client performs tasks, or may require an extensive trial-and-error process, with input from many personnel. In complex cases,

several problem-solving session and an extensive search for outside equipment resources may be necessary.

In any case, the final outcome of the evaluation is to determine recommendations. Solutions to problems may fall under any one of these categories: adaptive behavior, commercial equipment, custom equipment and training. Solutions always begin with the possibility of the client learning an alternate technique or adapting his behavior, such as learning to dress in the wheelchair. Second, commercially available equipment that would solve the problem is identified and hopefully located for trial use. Identification of the appropriate device may, in some cases, be made only after an exhaustive search utilizing the resources mentioned earlier. Only after these first two avenues are exhausted is custom design and fabrication of devices considered. In these cases, engineering personnel then become extensively involved in the whole process, from the point of evaluation to end product. In addition to these three types of solutions, the need for training, either in adaptive behavior or use of the equipment once obtained, is identified. Extensive training such as would be needed for one-handed typing is beyond the scope of Project Threshold, and the client and referring persons are then provided with appropriate community resources.

The next step in the selection process is a written report, two to four weeks following the last session with the client. The evaluation results and recommendations are summarized, and details given of the specific tasks evaluated. When commercially available equipment is recommended, exact model numbers, local sources, and approximate costs are given. Every attempt is made to justify equipment identified in functional terms to provide clear documentation of need, assist the referring person with financial considerations, and make clear expectations of the results in terms of the client's change in abilities with the device, and how that will affect his performance at home, work, or school. Arrangements for fabrication of custom devices are clearly stated, and cost estimates given.

The last step in the process is follow-up with the referring person and client to ensure that Project Threshold recommendations were relevant and easily understandable. The avenue is left open for further refinement of information and modification of custom devices when indicated. Clients are sometimes re-referred to the program if their situation changes and new goals are established, or problems arise.

Case Example

This case is that of a 53-year-old woman, four years post-stroke with right hemiplegia. Shirley was referred to Project Threshold by her Department of Rehabilitation counselor, and had a vocational goal of homemaker. She was residing in a board and care home, and evaluation was needed, particularly in the area of kitchen activities, to determine her potential to live independently. Clarification of the referral revealed that the reason for evaluation was not only to identify equipment needs in relation to one-handed use, but also to determine if behavior problems such as confusion with memory loss would affect safety in performance.

During the interview, the client revealed that she had had little opportunity to attempt homemaking activities since onset of her disability, but that she was independent in her personal care. It was noted that her speech was rambling and often tangential, causing the case coordinator to question her organizational abilities.

After discussion in team meeting, a plan for evaluation in the Model Home by an occupational therapist was determined. Emphasis was to be placed on task performance in cooking an actual meal to determine appropriateness of commercially available devices and the client's ability to adapt to new methods and use one-handed equipment. Of particular concern was an assessment of her judgement, problem solving and organization in the kitchen, and safety with environmental distractions. After the appropriate equipment was located, preparation was made for a cooking evaluation, and staff and client were scheduled. Functional assessment showed Shirley to be ambulatory for short distances, but that she sat frequently in the wheelchair to perform activities. She was left-dominant with good dexterity, but non-functional in the upper right extremity. The evaluation revealed that the client's task performance outweighed her verbal skills, and that she was organized, attentive, and safe in home skills. As she had no use of the right arm, she was an ideal candidate for commercial devices designed for one-handed use, and learned quickly how to utilize them in the equipment trial. Overall problem-solving and planning skills were noted as being adequate for independent living, despite verbal distractability. Adaptive behavior was introduced to her in methods of kitchen organization and performing activities once it was determined she was capable of making changes. Resource reading material and commercially available equipment were recommended for her. These recommendations were included in the written report to the rehabilitation counselors, and local vendors for specific pieces of equipment were listed.

The report also included recommendations for further professional input once Shirley obtained her apartment, as she would not have the adapted bathroom facilities of the board and care home. After several months, she was re-referred to Project Threshold, and a home visit was made for equipment recommendations for toileting and bathing. She had already obtained a frame for the toilet and a small tub bench, but assessment revealed she needed additional equipment, including a raised toilet seat and tub safety rail, for greater ease and safety in these activities. An additional report with description of performance and specific equipment recommendations was sent, and the case was closed.

This case is an example of a relatively simple evaluation in terms of personnel, time, complexity and cost of solutions. Even so, use of the selection process was valuable in determining evaluation parameters early, assuring a thorough rele-

vant evaluation and appropriate follow-up. To Shirley, this intervention was a major factor in her change in lifestyle to a happier, independent existence.

Implications of Selection Process

The steps of this process have evolved over the first six years of Project Threshold's existence. We have felt the implications of use of this systematized approach in noting growth and changes in the program. Initially, the vast majority of solutions involved custom devices; now the majority of solutions are found in adaptive behavior and/or commercially available equipment.

Service Categories	Percentage of Cases
Problem identification and/or adaptive behavior recommendations	20%
Evaluation and recommendation of commercially available equipment	57%
Evaluation and modification of commercially available equipment	9%
Evaluation and custom design and fabrication of equipment	14%

Service Category Statistics for Project Threshold 1981-1982 (Total = 80 clients)

It is significant to note that despite the fact that all clients served are severely disabled, in 77% of these cases the solutions involved adaptive behavior and/or commercially available devices, and resulted in lower average costs per client. When these more conservative methods have been exhausted, however, custom modification and fabrication of equipment becomes crucial to problem solution. This occurred in 23% of the cases.

EVALUATION FORMATS

The following evaluation forms are two examples of client assessments that can be used in the selection process to identify problem areas prior to the formulation of solutions. The first is from Project Threshold; it provides guidelines for an initial client interview, and would be completed by the service provider. The second has been used at the Center for Independent Living; it could be filled in by the client prior to meeting with the service provider. Both lend themselves well to preparing written reports.

PROJECT THRESHOLD

Guidelines for Initial Client Interview

I. General Information

Client's Name _____ Height _____ Weight _____
Telephone _____ Age _____

Disability _____

Previous Rehabilitation _____

_____

Current Living Situation:
Alone _____ With Attendant _____ With Family _____

Other _____
House _____ Apartment _____ Other _____
Own _____ Rent _____

Assistance Provided:
Attendant _____ Homemaker Chore Services _____

Other _____
Number of Hours _____ per _____

II. Mobility

Ambulation: Yes _____ No _____

Devices used _____

_____

Wheelchair: Yes _____ No _____
Manual _____ Type _____

Method of Propulsion _____

Powered _____ Type _____

Method of Control _____

Describe use _____

_____

Ability to get in and out of house (ramps, steps, doors, locks): _____

_____

_____

Transportation:
Drive Yes _____ No _____
Type of Vehicle _____

Equipment Used _____

Transfer _____

_____

Public Transportation Use _____

_____

Other _____

_____

57

III. Description of Extremities Use

Upper Right _____

Left _____

Lower Right _____

Left _____

Devices used _____

_____

Sensation:
Upper Right _____

Left _____

Lower Right _____

Left _____

Other Factors Affecting Use:
ROM/Contractures _____

Endurance _____

Other _____

IV. Body Handling Skills

Sitting Balance
Bed: Supported _____ Unsupported _____
Wheelchair: Supported _____ Unsupported _____
Roll from side to side: Yes _____ No _____
Come to sitting from supine: Yes _____ No _____
Stand from sitting position: Yes _____ No _____

Bed Transfers _____

_____

Position self in bed: Yes _____ No _____

Relief of ischial pressure _____

_____

V. Activities of Daily Living

A. Eating: Independent _____ Assisted _____ Unable _____

Describe methods/equipment used: _____

_____

Light Hygiene/Grooming: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

B. Dressing:

Upper extremity: Independent _____ Assisted _____ Unable _____
Lower extremity: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

C. Toileting

Bladder control: Yes _____ No _____

Methods/equipment used: _____

_____

Bowel control: Yes _____ No _____

Methods/equipment used: _____

_____

Toilet Transfer: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Hygiene/Management of Clothing:
Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

D. Bathing: Independent _____ Assisted _____ Unable _____

Bathtub _____ Bathtub with Shower _____
Shower Stall _____ Bed _____
Transfers: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

E. Homemaking

Cooking: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Marketing: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Laundry: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Light Housekeeping: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Heavy Housekeeping: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

VI. Vocational Information

Current Activities/Plans _____

_____

_____

Skills:
Writing: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Typing: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Phoning: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Filing: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Managing books and papers: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Note Taking: Independent _____ Assisted _____ Unable _____

Methods/equipment used: _____

_____

Other _____

_____

VII. Leisure

Describe leisure activities: _____

_____

_____

Describe methods/equipment used: _____

_____

VIII. Description of a typical day _____

_____

_____

IX. Preliminary goal setting for Project Threshold intervention _____

_____

_____

INDEPENDENT LIVING SKILLS CHECKLIST

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
ACTION OR ACTIVITY						
Dressing:						
Dress upper body						
Dress lower body						
Shoes, socks						
Buttons, zippers, bras						
Transfers:						
Getting into bed						
Getting out of bed						
Positioning yourself in bed						
Getting on toilet						
Getting off toilet						
Getting into car						
Getting out of car						
Grooming & Hygiene						
Getting into tub/ shower						
Getting out of tub/ shower						
Washing hands & face						
Light Grooming						
Washing hair						
Brushing teeth						
Toilet hygiene						

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
Light Grooming, cont.						
Nail care						
Make-up						
Ear care						
Brushing hair						
Shaving						
Feminine hygiene						
Eating & Drinking						
Feeding self						
Cutting						
Drinking						

PROBLEMS: (describe) _____

_____

_____

Bowel & Bladder

Controlling urination: (describe, day & night) _____

_____

_____

If catheter, reserve set available? Yes _____ No _____

Controlling defecation: (describe) _____

_____

_____

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
Physical Mobility:						
Mobility aids						
Walking - inside home						
Walking - outside home						
Up/Down Stairs						
Escalators						
Elevators						
Curbs						
Wheelchair:						
Manual - propelling inside home						
Manual - propelling outside home						
Electric - functions in rain						
Using Public Transportation						
Bus						
BART (rapid transit)						
Airplanes/trains						
Using Private Transportation						
Drive self						
Own vehicle						
Valid driver's license						
D.P. plates						

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use
COMMUNICATION SKILLS						
Writing - signature						
Speaking						
Reading						
Listening						
Signing						
Typing						
Work board						
Telephone						
ADL TASKS						
Cooking:						
Using range						
Using oven						
Using refrigerator						
Using freezer						
Using sink - faucets						
Transporting cookware, ingredients, etc.						
Using can openers						

Kitchen accessibility: (describe)

Safety precautions (describe)

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
Cleaning:						
Washing dishes						
Laundry						
Housecleaning						
Vacuuming						
Dusting						
Floors						
Other:						
Opening/closing doors						
Problem door openings						
Keys						
Light switches						
Pay phones						
Money handling						
Checking account						

Please check (X) the appropriate box; if equipment is used, mark the box (E); if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.	FUNCTIONAL ABILITY					DESCRIPTION
	Always independent	Can,but usually don't	Absolutely can't	Want to change	Not applicable	Where relevant, please describe the aid, either personal or mechanical, that you use
ADL - HEALTH						
Taking medications						
Diet/nutrition: (describe)						
Range of Motion - Exercise (frequency)						
On-going therapy						
Skin care (pressure sore prevention)						
ADL - EQUIPMENT						
Wheelchair Maintenance						
General						
Water in battery						
Air in tires						
Recharging battery on electric chair						
Maintenance of mobility aids						
Maintenance of assistive devices						

SELECTED PUBLICATIONS: DEVICE SELECTION, BASIC USE AND TRAINING

The following resources have more information on assessment and the selection process:

Assistive Devices for Handicapped Students, A Model and Guide for a Statewide Delivery System. National Association of State Directors of Special Education, Washington, D.C. 1980. 27 pp. $4.50

Equipment for the Disabled. National Fund for Research into Crippling Diseases. 2 Foredown Drive, Portslade, Brighton, England. 10 booklet series which provides guidelines to help in the selection of equipment. Pictures of commercially available and do-it-yourself aids, 1973-1980.

Independence through Environmental Control Systems. David Symington, et al. Canadian Rehabilitation Council for the Disabled, Toronto, Ontario, Canada. 1980. 64 pp. $5.00

Occupational Therapy. Willard & Spackman's 5th Edition. Helen Hopkins and Helen Smith, Editors. J.B. Lippincott Co., Philadelphia. 1978.

Project TEACH: Technical Education Aids for Children with Handicaps. A Model and Demonstration Project. Memphis City Schools, Division of Special Education, Department of Pupil Services, Memphis, Tennessee.

Project Threshold. A Model System for Delivery of Rehabilitation Engineering Services. Rancho Los Amigos Rehabilitation Engineering Center, Downey, California. April 1979.

Project Threshold: A Model System for Delivery of Rehabilitation Engineering Services. Annual Report 1980. Rancho Los Amigos Hospital, Rehabilitation Engineering Center, Downey, California.

Rehabilitation Engineering Sourcebook. Institute for Information Studies. Falls Church, Virginia. 1979, updated annually.

"A Systematic Approach to Evaluating Physical Ability for Control of Assistive Devices." Proceedings of the Fourth Annual Conference on Rehabilitation Engineering, 1981. Rehabilitation Engineering Society of North America. 4405 EastWest Highway, Bethesda, Maryland 20814.

Team Assessment of Device Effectiveness. Rehabilitation Engineering Center, Children's Hospital at Stanford, Palo Alto, California. October 1980.

These publications offer information on selection, training and use of devices:

Aids: Decision and provision: A Systematic Approach to the Selection of Assistive Devices for the Disabled Person (2nd ed.). Community Occupational Therapy Assoc., 1974 Wilson Avenue #201, Toronto, Ontario, Canada M5M 3A7. 1982. $50.00. List and comparison of commercially available wheelchairs, communication aids, self-help devices, and guidelines for environmental access.

Aids to Independent Living: Self-Help for the Handicapped. Edward Lowman, M.D., Judith Klinger, OTR. McGraw Hill Book Company, Blakeston Division, New York. The American compendium of assistive devices; also describes adaptive techniques and innovative ways to use devices. (Out of print, but available in most rehab dept. libraries, OT depts., etc.) 1969.

Basic Rehabilitation Techniques: A Self-Instructional Guide. Robert D. Sine et al., editors. Aspen Systems Corporation, 1600 Research Blvd., Rockville, MD 20850. 1981. 268 pages. $20.95. This book was written for nurses who work with disabled persons. Its goal is to provide the nurse with the basic rehabilitation techniques to enable him/her to train disabled people in ordinary functional activities. This includes self-care activities, mobility, pressure relief, pain, etc. The techniques described are simple and utilize equipment that is readily available. The text is written in clear language. Excellent drawings and pictures add to comprehension of details of the technique. Because the techniques include training in the use of assistive devices, this book is also useful to more than just nurses as an introductory guide to the equipment most commonly used by the disabled. It discusses selection, use and training with the devices.

Exercises and Selfcare Activities for Quadriplegic People. Accent Special Publications, Box 700, Bloomington, IL 61701.

Handling the Young Cerebral Palsied Child at Home. N.R. Finnie, FCSP, A Sunrise Book, E.P. Dutton, 2 Park Avenue, New York, NY 10016. $5.95. 1975.

Mealtime Manual for People with Disabilities and the Aging. Institute of Rehabilitation Medicine, New York University Medical Center and Campbell Soup Company, Box (MM) 56, Camden, NJ, 1978.

Physical Management for the Quadriplegic Patient. J. Ford and B. Duckworth. F.A. Davis Company, Philadelphia, PA. (Out of print; look for it in an OT or PT or a rehab dept.) 1974. $16.95. This textbook on the physical management of quadriplegic patients includes an appendix which describes do-it-yourself aids for these individuals.

Providing Early Mobility. Intermed Communications, Inc., 132 Welsh Road, Horsham, PA 19044. 1980. This book is part of a series of training manuals for nurses. It includes detailed instruction needed to use the following pieces of transfer and positioning equipment: cradle boots, hand rolls, footboards, hand splints, transfer boards, and mechanical lifters. In other sections of the book, concise captions and how-to-do-it photos show you how to safely transfer a patient with halo traction; how to select the proper crutches, cane, walker, or wheelchair for your patient; and how to teach him to use the equipment correctly. It also includes step-by-step procedures and photos for turning and positioning, range-of-motion and isometric exercises, and transfer techniques. This is an excellent training manual for anyone; for instance, a disabled person could use

it to train a personal care attendant. The photos are so explanatory, the text is almost unnecessary.

The Selection of Toilet Aids for Disabled People: Results of an Evaluation Study and Guidelines for the Selection of Toilet Aids for Adult Disabled People. The Institute for Consumer Ergonomics, 75 Swingbridge Road, Loughborough, Leicestershire, LE11 OJB, England. 1981. This booklet is the first of two, and deals only with toilet aids. A second booklet will be concerned with bath aids.

Self-Help Manual for Patients with Arthritis. Arthritis Health Professions Section of Arthritis Foundation, 3400 Peachtree Road, N.E. Atlanta, Georgia 30326. 1980

Technology At Home

TECHNOLOGY AT HOME 55

TECHNOLOGY AT HOME 55

INTRODUCTION 57
HOSPITAL BEDS AT HOME 57
HOME MANAGEMENT 60
PERSONAL CARE 62
CLOTHING & SHOES 62
ARCHITECTURAL ADAPTATIONS 63

MORE PUBLICATIONS ON AT-HOME TECHNOLOGY & TECHNIQUES 64

ENVIRONMENTAL CONTROLS AND OTHER ELECTRONIC DEVICES FOR THE HOME 66

TECHNOLOGY AT HOME

It seems that once you open the door to (information about) the home, the room gets very unorganized. A great deal has been written in this area -- about assistive devices, adaptive techniques, ideas, inventions, designs. Most books have a little of everything in them. An attempt to separate publications by function -- e.g., cooking, self-care -- is no more successful than trying to categorize according to type of aid (furniture, bathing aid).

In this section, a few of the more obvious categories of devices and/or applications have been drawn out from the general publication guide, and listed as separate categories. But to save space, most home-oriented devices remain joined together. The list of references to self-care aids looked a lot like the books on bathroom aids. The categories that did stand out in the available literature are often also covered in the general topic publications, so you should refer to **Information Resources** section, too.

HOSPITAL BEDS COME HOME

For the person who needs a hospital bed at home, the available options make careful selection essential.

This list of HOSPITAL BED OPTIONS and considerations for selection is excerpted from the article "Hospital Beds Come Home" by Helen Cioschi, RN, and Mary Pat Erdner, RN, which appeared in the May, 1984 issue of Rx: Home Care, Vol. 6, No. 6, pp. 70-76. It is reprinted here with permission of Barrington publications, 825 Barrington Avenue, Los Angeles CA 90049. For more information, please refer to the article.

"Once the need for a hospital bed has been determined, a thorough assessment of the patient's bed and mattress requirements is necessary. Equipment is selected on the basis of its suitability to the patient's level of function, home environment, and access to funding...

"Factors in Bed Choice

"Will the bed and mattress meet the medical and functional needs of the patient? Will they provide safety and support?

"Can the patient use the equipment to maximize independence? Are the bed controls accessible to the patient? Can the bed and mattress height be adjusted for a safe wheelchair-to-bed transfer? Would it be helpful to the patient to have side rails that adjust up or down? Is the mattress durable, comfortable, and easy to maintain? Is it more important for the patient to have functional mobility or skin pressure relief?

"What kind of repair and delivery service will the dealer provide? What kind of service is offered after the warranty expires?

"Is it more cost-effective to rent or purchase this equipment?

Hospital Bed Options

Optional Features	Characteristics & Indications
Side Rails	
1. Full length	o Ensure safety of neurologically impaired, confused, or sedated patients o Increase bed mobility of patients when turning side to side o May limit transfer mobility
2. Half length	o Ensure safety of patients with minimal neurologic impairment by reminding them to seek assistance o Increase bed mobility of patients when turning side to side o Easier than full-length side rails for patients to put up and down for independent transfer
3. Half length, tuckaway	o Recess under the bed when in down position o Facilitate transfers by allowing wheelchair to be moved closer to bed o Appear less conspicuous than fixed side rails o May be less secure than fixed side rails when not in locked position
4. Home-style	o Can be placed on a non-hospital bed o Cost-effective for patients who do not require a hospital bed but who need the security of side rails o Adjust to an up or down position o Ensure safety of neurologically impaired, confused,

71

	comatose or sedated patients. o Must be secured properly to side of bed to ensure optimal safety.
Bed Controls	
1. Located on side rail	o Easily accessed. o Patients must have good hand control. o Patients must be cognitively intact.
2. Hand	o Can be reached easily by patients who are cognitively intact or can be placed out of reach of patients who are confused. o Control buttons can be recessed, raised, or touch-controlled depending on patient's fine motor function.
3. Environmental control unit	o Assists patients who lack finger or upper extremity strength to control both the bed and and electrical elements such as lighting. o High cost may be prohibitive. o Sophistication of unit may result in complex repairs in the event of breakdown.
Bed Deck	
1. Link	o Holds mattress adequately. o May puncture a water or gel mattress. o Time-consuming to clean.
2. Pan	o Flat surface will not puncture a water or gel mattress. o Easy to clean.
Bed Size	
1. Single	o Least expensive. o Will fit into a small room. o Size does not allow for optimal positioning.
2. Double	o May enhance mobility, especially for larger clients. o Adequate space for bedmate.
3. Queen	o Preferred by many patients. o Size may interfere with bed mobility. o Adequate space for bedmate.
4. King (two single beds side by side	o Allows patient to use hospital bed while bedmate uses nonhospital bed. o Allows patient to use water mattress while bedmate uses standard foam mattress.

Mattresses	
1. Standard foam	o Available in various densities and thicknesses. o Those with vinyl covers resist staining. o Do not distribute weight or decrease skin pressure. o Patient's position must be changed frequently.
2. Water	o Distribute weight and decrease skin pressure. o Useful for patients with skin "breakdown" or high risk of skin breakdown. o Will not enhance and may interfere with functional mobility. o May be heavy and require additional motors or reinforced frame to support the weight.
3. Air	o Distribute weight and decrease skin pressure. o Provide a poor base of support. o May interfere with the function of patients.
4. Gel	o Distribute weight and decrease skin breakdown. o Useful for patients with skin breakdown or high risk of skin breakdown. o Provide a firm base of support for functional mobility. o Available in sections or as a whole mattress.

72

Mattress Surfaces

A study, "Pressure Relief Characteristics of Six Therapeutic Mattress Surfaces," by I. Herszkowicz, et al., was reported in the Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, 1983.

"The objective of this study is to compare the effectiveness of various bed support surfaces in providing pressure relief and redistributing loads away from areas of bony prominence and to determine if body builds affects related effectiveness."

The team evaluated these six mattress surfaces: Stryker, ROHO, Puff Pak 2", Puff Pak 4", Gaymar (low cycle) and Lapidus (low cycle), and reached these

"CONCLUSIONS

"1. All of the therapeutic mattresses appear to be significantly more effective in producing lower pressures than the standard mattress, especially under the trochanters.

"2. The ROHO mattress appears to be slightly more effective in reducing the maximum pressures under the trochanters than the other therapeutic mattresses tested. However, even though the ROHO appears to be more effective in rendering lower pressures, it may be impractical from the nursing care standpoint, due to the difficulty of using it.

"3. When considering all of the pressure areas monitored in the study, the therapeutic mattresses are all of statistically equal value in reducing pressures. However, a particular mattress should be matched to a specific patient, since, as can be seen from the ranges noted from each mattress, each subject did do better on one mattress than on the rest.

"4. The Lapidus has the disadvantage of a large pump, which cannot be placed under the patient's bed due to its size. This may be a potential problem in some hospitals or home settings, as it is a safety hazard for those taking care of the patient.

"5. Females generally have lower maximum pressure than males on all the mattresses tested.

"6. There appears to be a slight difference between the "thin" and "average" body type subjects, with thin subjects generally having high pressures under the trochanters and the sacrum.

"7. The magnitude of the pressure under the sacrum is often dependent on the patient's lower back curvature which causes the pressure to shift to the coccyx."

Please refer to the article for more specific information on methodology and results.

HOME MANAGEMENT

There are many devices on the market designed to help able-bodied people perform household tasks more efficiently. Because of their design, some require no adaptations for use by disabled people. Other commercially available products need only simple adaptations to be usable.

There are also products made especially to help the disabled person to be more independent. These available gadgets are too numerous to include here. Product information can be obtained from ABLEDATA, or by paging through some of the books in the publications list.

Selected Publications

These two free booklets about designing environments for disabled people, "Aids to Independent Living" and "Designs for Independent Living," show how everyday tools and household products can be adapted for easier use by disabled people. Available free from Appliance Information Service, Whirlpool Corp, Administrative Center, Benton Harbor, MI 49022.

Aids to Independent Living. Suggestions for installing and operating home appliances for easier use by disabled persons. In many instances, a special tool, control or installation may be needed so someone with a disability can use an appliance most conveniently. While most of these modifications are made by the user, some manufacturers do offer special aids to help owners adapt their appliances to meet the need of a specific disability. Such aids include soft adaptor knobs for those with arthritic hands and Braille controls and instructions for blind consumers. Some manufacturers and appliance retailers offer these aids at no charge or at a very moderate cost.

Designs for Independent Living. This booklet addresses the problems of selecting, positioning, and installing major home appliances in a kitchen or laundry room for most convenient use by homemakers with physical disabilities. While it is designed primarily for those who must work from wheelchairs, many of the designs and ideas can be readily adapted to kitchens and laundries for use by those whole disabilities -- strokes, arthritis, multiple sclerosis, heart disease, visual impairment, and many others -- impose other limitations.

Adaptations and Techniques for the Disabled Homemaker. K. Hodgeman and A. Lundberg. Sister Kenny Institute, 811 E 27th Street, Minneapolis, MN 55404. 4th edition. 30 pages.

Cooking Without Looking: Food Preparation Methods and Techniques for Visually Handicapped Homemakers. Esther Knudson Tipps. American Printing House for the Blind, Louisville, Kentucky. 1978.

The Disabled Homemaker. Hoyt Anderson. Charles C. Thomas Publisher, 2600 S. First Street, Springfield, IL 62717. 1981. Opening chapters focus on psychological need for independence, while realistically pointing out the risks involved in independent living. The following chapters provide advice on personal care and homemaking tasks for both ambulatory and nonambulatory individuals. Also included are architectural considerations.

Homemaking Manual: A Reference Manual for Rehabilitation Teachers. Western Michigan University, Kalamazoo, Michigan. 1980. A reference manual for rehabilitation teachers of blind homemakers. Chapters cover personal care techniques, identification of personal and household items, cleaning, laundering, cooking, and household record-keeping.

Homemaking Unlimited Series. A.M. Burton and V. Trotter. Independent Living Rehabilitation, Dept. of Human Development and the Family, University of Nebraska, Lincoln, Nebraska 68583. $0.10 each.
1. Easy-to-Use Kitchen
2. No Stoop, No Stretch Kitchen Storage
3. Easy-to-Use Sink Center
4. Easy-to-Use Cooking and Serving Center
5. Easy-to-Use Mixing Center
6. Streamlined Household Tasks
7. The Bathroom Made Safe and Usable
8. Cleaning Supplies -- Keep Them Handy

Brief descriptions of principles and applications for persons with physical disabilities.

Home Management (Equipment for the Disabled Series). Oxford Regional Health Authority, 2 Foredown Drive, Portslade, Brighton BN4 2BB, ENGLAND. Lists and describes, with photographs, devices and equipment for the physically disabled homemaker. Covers categories such as safety, kitchen planning, storage, food preparation and cooking, cleaning and refuse disposal. Includes reference and resource lists.

"Kitchen Aids: Resources for the Visually Impaired Cook." Mary Beth Caruso. Aids and Appliances Review, Issue No 8, Spring 1983. The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158. 617/969-6200. This issue presents the most commonly used aids designed for the visually impaired and some alternative uses for everyday cookware. The text is divided into sections dealing with the various aspects of kitchen management and food preparation. A resource guide follows sections where appropriate. Each resource guide is a sampling of the types of aids explained within the text. For simplicity, many of the common use items have been selected from national mail order houses; however, most of these items are also commercially available in local retail stores. The modified or adapted aids listed are available from distributors, nationally and internationally, who specialize in aids and appliances for the visually impaired and blind individual.

The Kitchen Book. Terence Conran. Crown Publishers, New York. $30.00. 360 pages. 1974. Small concise section on design ideas for the disabled and elderly.

A Manual for Training the Disabled Homemaker. H.A. Rusk, E.L. Kristletter, J.S. Judson, G.M. Hunt, and M.E. Zimmerman. Institute of Rehabilitation Medicine, New York, NY. 1974. Reprint of a 1955 manual which described hints and devices for disabled homemakers which are still useful. The emphasis is on low cost, easily made equipment rather than electronic gadgets.

7-2

Mealtime Manual for People with Disabilities and the Aging. Prepared by Institute of Rehabilitation Medicine (New York University Medical Center). Available from Campbell Soup Company, Box (MM) 56, Camden, NJ 08101. 1978. Principles, techniques and equipment suggestions for meal preparation and homemaking. Updated to include information on food processors, etc. This is a highly recommended book.

On Your Own. Division of Continuing Education, University of Alabama. Published monthly from January, 1970 through December, 1980. Produced as a special project of the Continuing Education in Home Economics program at the University of Alabama, this newsletter provided information about methods of adapting the home environment for use by disabled people. Designed for use by disabled homemakers and professionals working with them.

Preprimer Cooking or Cooking Techniques for the Blind, 2 volumes. Sally Jones. American Printing House for the Blind, Louisville, Kentucky. 1978.

Rehabilitation Medicine. Howard Rusk, M.D. Fourth edition. C.V. Mosby Company. 1977. $28.50. Note chapters on Principles of Homemaking and Housing.

Resources in Home Economics for the Blind Homemaker, Rev. 1. Cooperative Extension Service, Amherst, Massachusetts.

Running Your Own Home. Royal National Institute for the Blind, London, England.

A Student's Notebook: A Cooking Manual for Teenagers Who Like to Cook. Eleanor Beissell Martin. American Printing House for the Blind, Louisville, Kentucky. 1977.

The Wheelchair Gourmet: A Cookbook for the Disabled. Mary Blakeslee. Beaufort Books, 9 E. 40th Street, New York, NY 10016. 1981. 192 pages spiralbound. $8.95.

The Wheelchair in the Kitchen. Paralyzed Veterans of America, Inc., 801 18th Street, NW, Washington, DC 20006. 1973.

Audiovisuals

The Handicapped Homemaker Series. New York University Medical Center, Learning Resources Facility, Institute of Rehabilitation Medicine, NY, New York. Available from: Rehabfilm Rental Catalog, Rehabfilm, 20 West 40th Street, New York, NY 10018. 16 mm color film; each film 28 minutes long. Rental $25.00/film. 1971. Series includes "The Homemaker with Arthritis," "The Homemaker with Incoordination," "The Homemaker with the Use of One Arm," "The Homemaker with Weak Upper Extremities."

The Homemaker with the Use of One Hand. Station K, Atlanta GA 30324. National Medical Audio-Visual Center (Annex), M-2243-X. 16mm color, sound; 28 minutes. Free on short-term loan. Describes equipment, kitchen planning, and techniques of one-handed cooking and kitchen work.

Modifying Major Home Appliances

At least three manufacturers now offer braille overlays for control panels of their microwave ovens. The overlays do not impeded the use of controls by sighted users, and can be easily removed for cleaning.

Whirlpool provides a panel that fits over its touch panel models along with a Braille use and care guide.

Amana offers an overlay for its control panel that makes it easy to set the times and temperatures and to check timing progress. Included are seven audio cassette tapes "voice indexed" for quick reference. The cassettes contain use and care information, general cooking guidelines, and recipes.

GE will send braille panels for microwaves. Send model and serial number of the appliance and kitchen plan requests to GE Consumer Relations, GE, Appliance Park, Louisville, KY 40225. In addition, a service technician will put braille-style knobs on GE Hotpoint ranges and home laundry equipment free of charge for visually-impaired consumers.

Help is Available from Manufacturers

A good source of help for modifying a major home appliance is its manufacturer. If you do not have the address or telephone number of the company which manufactured your appliance, write to:

Association of Home Appliance Manufacturers
(AHAM)
20 North Wacker Drive
Chicago, IL 60606

PERSONAL CARE

Bowel Management. Accent Special Publications, Box 700, Bloomington, IL 61701.

Disabled Eve: Aids in Menstruation. Disabled Living Foundation, 346 Kensington High Street, London, W14 8NS ENGLAND.

Personal Care. Equipment for the Disabled Series, Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB ENGLAND. Lists and describes, with photographs, personal care aids for disabled persons. Covers categories such as grooming, bathing, toilets, incontinence and pressure sore prevention. Discusses do-it-yourself materials and includes a section on problem solving.

A Step by Step Guide to Personal Management for Blind Persons. American Foundation for the Blind, New York, NY. 1974.

CLOTHING

Clothing For Handicapped People: An Annotated Bibliography and Resource List. Naomi Reich, Patricia Otten, Marie Negri Carver. University of Arizona, Tucson, AZ 85721. Available from: President's Committee on Employment of the Handicapped, Washington, DC 20210. 1979. This book is comprehensive; it seems to list everything related to clothing prior to its publication date in 1979. If you are interested in any aspect of clothing, start with this book.

Other Publications On Clothing

These have been printed since 1979, and are therefore not in the above bibliography.

Accessible Fashions. S. Voorhees and A. Thompson. 23 pages. National Access Center, 1419 27th Street NW, Washington, DC 20007. 1981. Illustrated booklet addressing the psychological aspects of clothing, fashion design, alterations and shopping patterns for persons with physical disabilities. Resource listing is included.

Adapted Shirts to Fit Over a Halo Vest. V.A. Moratz. American Journal of Occupational Therapy, #8, 524-525. 1979.

Clothes for Disabled People. Maureen Goldsworthy. B.T. Batsford, Ltd., North Pomfret, VT 05053. 117 pages. $11.95. 1981.

Clothing and Dressing for Adults. E.R. Wilshire, Editor. Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB ENGLAND. 67 pages. $11.05. 1981. Booklet includes a variety of readily available clothes, a range of patterns showing different styles and features which may provide ideas for the home seamstress, as well as various specially designed clothes and adaptations.

"Clothing for the Disabled." Rehab Brief, February 27, 1981. Available from: National Institute of Handicapped Research, Office of Special Education and Rehabilitative Services, Department of Education, Washington, DC 20201.

Clothing for the Handicapped, the Aged, and Other People with Special Needs. A. Hoffman. Charles C. Thomas, Publisher, 2600 South First Street, Springfield, IL 62717. 176 pages. $14.75. 1979. A comprehensive volume providing information on all aspects of clothing needs of the physically disabled, aged, chronically ill, and mentally retarded. Included are psychological aspects, selection and adaptation of clothing, and sources of specially designed clothing.

Clothing for Handicapped People: An Annotated Bibliography and Resource List. Naomi Reich. University of Arizona Cooperative Extension Service, Tucson, Arizona 85721. Also distributed by the President's Committee on Employment of the Handicapped, Washington, DC 20210.

The Cover-up: Neckware for the Laryngectomee and Other Neck-Breather. Dan H. Kelly and Peggy Welborn. College-Hill Press, 4580 E. Alvarado Canyon Road, San Diego, CA 92120. 98 pages. $15.00. 1980.

Information Systems for Clothing and Daily Living Needs of Handicapped People. N. Reich, P. Otten and J. Mott. University of Arizona, Division of Clothing, Textiles, and Interior Design, School of Home Economics, Tucson, AZ 85721. 93 pages. $5.00. 1980.

A Manual for Solving Clothing Problems for Persons with Physical Disabilities. Kay Caddel, Route 8, Box 12T2. Lubbock, TX 79407. $3.00. Describes how to take body measurements of a disabled person, to identify fitting problems and to adjust patterns for home sewing.

SHOES

Cinderella of Boston, 8607 Canoga Avenue, Canoga Park, CA 91304. Cinderella Shoes specialize in sizes 1 1/2 through 5.

Helen's Shoe Service, Route 4, Red Wing, MN 55066. File of information and service to individuals who wear two different size shoes or only need one shoe. Correspondence carried on between those who have available shoes and those who need them to facilitate exchange.

Hill Brothers, 99 Ninth Street, Lynchburg, VA 24504. Free catalog of hard-to-find ladies' shoes. Sizes 2 1/2 to 14, AAAA to EEE.

National Odd Shoe Exchange, 3100 Neilson Way, Apt. 220, Santa Monica, CA 90405. You send your name in to seek a mismate with whom to exchange shoes. Does not handle the shoes themselves, only names of people.

Jeanne L. Sallman, Odd Shoe Exchange, RR4, Indianola, IA 50125. $15 registration fee, plus annual dues of $7.50.

ARCHITECTURAL ADAPTATIONS

Access Information Bulletins, National Center for a Barrier Free Environment, 1015 Fifteenth Street NW, Washington, DC 20005. May, 1981.

Accessibility Assistance: A Directory of Consultants on Environments for Handicapped People. National Center for a Barrier Free Environment, Washington, DC. $3.25. 1978.

Barrier Free Design Equipment and Aids Catalog. Michigan Center for a Barrier Free Environment, 6879 Heather Heath, West Bloomfield, Michigan 48033. 1978. $5.00.

Design for Accessibility. Robert James Sarenson, Architect. McGraw Hill Book Company, New York, NY. 1979.

"Designing for the Handicapped." Better Homes and Gardens Building Ideas. Spring 1983 Issue. $2.50. pp. 97-111.

Design for Independent Living. Raymond Lifchez and Barbara Winslow. Watson-Guptill Publications, 1515 Broadway, New York, NY 10036. 1979. 208 pages. $25.00 (also available in softcover).

Designing for the Disabled. Selwyn Goldsmith. RIBA Publications, Ltd., 66 Portland Place, London, England. 3rd Edition, 1976. 525 pages, 478 diagrams. $70.00.

Home in a Wheelchair. Joseph Chasin; Jules Saltman, Editor. Paralyzed Veterans of America, 801 18th Street NW, Washington, DC 20006.

The House Book, 1974, 448 pages. Terence Conran New York, NY. $30.00. Small concise section on design ideas for the disabled and elderly.

Housing and Furniture. Equipment for the Disabled Series. Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton, BN4 2BB, ENGLAND. Lists and describes, with photographs, adaptive furniture and housing accommodations for physically disabled persons. Covers categories such as ramps, handrails, doors, stairs and lifts, windows, electrical fittings, beds, chairs, and other furniture adaptations and accessories.

Housing Interiors for the Disabled and Elderly. Bettyann Raschko. Van Nostrand Reinhold, New York, NY. 1982. 360 pages. $34.50.

Ideas for Making Your Home Accessible. B. Garee, editor. Accent Special Publications, Cheever Publishing, Inc., P.O. Box 700, Bloomington, IL 60701. 1979. 104 pages. $6.50. Describes architectural adaptations to make houses accessible to people who use wheelchairs. Discusses costs, location, garage, entrance, general interior, kitchen, bathroom, living room, mobile homes, ramps and lifts. Lists sources of equipment and devices, publications on accessibility, and ideas about funding. Illustrated with drawings and photographs.

Resource Guide to Literature on Barrier-Free Environments with Selected Annotations. Architectural and Transportation Barriers Compliance Board, Washington, DC 20202. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20202. 1980.

Tools for Accessibility: A Selected List of Resources for Barrier Free Design. National Center for a Barrier Free Environment, 1015 Fifteenth Street NW, Washington, DC 20005. May, 1981.

Wheelchair Bathrooms. Paralyzed Veterans of America, Inc., 801 18th Street, NW, Washington, DC 20006. 1971.

Wheelchair House Designs. Eastern Paralyzed Veterans Association, 432 Park Avenue South, New York, NY 10016.

Wheelchair Interiors. Sharon Olson and Diane Meredith. National Easter Seal Society, 2023 W Ogden Ave., Chicago, IL 60612. 1973.

Organizations

Adaptive Environments Center
621 Huntington Avenue
Boston, MA
617/739-0088

Architectural and Transportation Barriers Compliance Board (A&TBCB)
330 C Street SW
Room 1010 Switzer Building
Washington, DC 20202
202/245-1591

National Center for a Barrier Free Environment (NCBFE)
1015 Fifteenth Street NW #700
Washington, DC
202/466-6896

MORE PUBLICATIONS ON AT-HOME TECHNOLOGY AND TECHNIQUES

Access. Lilly Bruck. Consumers Union Edition, Orangeburg, New York 10962. $5.50.

Access: The Guide to a Better Life for Disabled Americans. Lilly Bruck. Random House, 201 East 50th Street, New York, New York 10022. 1978.

Aids and Adaptations. K.P. MacBain, editor. The Canadian Arthritis and Rheumatism Society, 45 Charles Street East, Toronto M4Y 1S3, Ontario, CANADA. $2.00. 1975. Describes items which have been used successfully by patients in an occupational therapy department. Part I contains drawings and instructions for self-help aids, and Part II covers environmental adaptations. Bathing, toileting, homemaking and ambulation or transfer are emphasized.

Aids and Appliances. American Foundation for the Blind, 15 W. 16th Street, New York, NY 10011. 21st ed., 1975-1976. 34 pages, illustrations. $2.00. Various aids and home products (braille globes, pressure cookers, etc) helpful to blind consumers are discussed, and order information is included.

Aids: Decision and Provision: A Systematic Approach to the Selection of Assistive Devices for the Disabled Person (2nd edition). Community Occupational Therapy Association, 194 Wilson Avenue #201, Toronto M5M 3A7. 416/485-6384. $50.00. 1982. List and comparison of commercially available wheelchairs, communication aids, self-help devices, and guidelines for environmental access.

Aids to Independent Living: Self-Help for the Handicapped. Edward Lowman and Judith L. Klinger. McGraw-Hill, New York, NY 10036. 1969. 796 pages. $41.00 (Out of print).

Aids to Make You Able. Wendy Davis. Fred Sammons, Inc., Brookfield, IL. 1979. 114 pages. $6.95.

Aids to Make You Able -- Self Help Devices and Ideas for the Disabled. Beaufort Books, New York. 1981.

Bathroom Facilities Accommodating the Physically Disabled and the Aged. Owens-Corning, c/o Fiberglas Tower, Toledo, Ohio.

The Bed and Bath Book, 1978, 360 pages
The House Book, 1974, 448 pages
The Kitchen Book, 1974, 360 pages
Terence Conran. Crown Publishers, New York. $30.00 each. Small concise section in each book on design ideas for the disabled and elderly.

Disabled? Yes Defeated? No. Kathleen Cruzic. Prentice-Hall, Inc., Englewood Cliffs, NJ. 1982. 212 pages. $6.95. Resource guide that includes product information and do it yourself adaptations. Sections on ADL, housework, clothing.

Devices for Visually Impaired Diabetics. Alex H. Townsend. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. 1978. 8 pages.

Do It Yourself Again: Self Help Devices for the Stroke Patient. American Heart Association, 44 E 23rd Street, New York, NY 10010. 1969. 47 pages.

An Easier Way: Handbook for the Elderly and Handicapped. Jean V. Sargent. Iowa State University Press, Ames, Iowa 50011. 1981. 220 pages. $10.50.

Functional Aids for the Multiply Handicapped. Isabel Robinault. Harper & Row, Hagerstown, MD. 1973.

Getting Organized, Part II; Storage. Stephanie Winston. Warner Books, Inc., New York, New York. 1978.

Handicapped at Home. Sydney Foott. Quick Fox Press, 33 West 60th Street, New York, NY 10023. 1977. 71 pages.

Help Yourselves: A Handbook for Hemiplegics and Their Families. Ian Henry Publications, 38 Parkstone Avenue, Hornchurch, Essex, England. 3rd edition, 1979. 161 pages.

Helping the Handicapped A Guide to Aids Developed by the Telephone Pioneers of America. Call Telephone Company headquarters in your city and ask for the local chapter of the Telephone Pioneers of America. Though many of the devices are for the communication impaired, there are also sections on mobility aids, ADL equipment and toys.

Home Security. TimeLife Books Home Repair and Improvement Series. Time-Life Books, Alexandria, Virginia. 1979. 136 pages. $11.95. The section on accident-proofing a house includes 13 pages of directions and sketches for diminishing the dangers of bathrooms and stairs. Includes: installation of grab bars, creating a slip resistant surface, adding a rail to a stairway wall, and building an outdoor access ramp.

Housing and Home Services for the Disabled: Guidelines and Experiences in Independent Living. Gini Laurie. Harper & Row, 2350 Virginia Ave., Hagerstown, MD. 1977. 434 pages. $20.00.

How To Create Interiors for the Disabled: A guidebook for family and friends. Jane R. Cary. Random House, 201 East 50th Street, New York, NY 10022. 1978. 127 pages.

Independent Living for the Handicapped and the Elderly. Elizabeth May, Neva R. Waggoner, and Eleanor B. Hotte. Houghton Mifflin Company, 2 Park Street, Boston, Mass 02107. 271 pages. $11.50. This book demonstrates ways in which work simplification techniques used by industrial managers may be applied to the home by handicapped persons. The care of young children by physically limited parents and the design and adaptation of clothing are covered. It includes a bibliography of over 400 citations classified by subject.

Instructional Materials in Independent Living: A Bibliography. B. C. Smith. Materials Development Center, Stout Vocational Rehabilitation Institute,

University of Wisconsin-Stout, Menomonie, WI 54751.

International Guide to Aids and Appliances for Blind and Visually Impaired Persons, 2nd. edition. American Foundation for the Blind, 15 W 16th Street, New York, NY 10011. Printed by Port City Press, Baltimore, MD 21208. 255 pages. This is a comprehensive guide to more than 1,500 devices of 270 distributors in 28 countries. Listings for each item include name, manufacturer's address, price, availability, description. (Out of print)

It Isn't Always Easy ... But It's Possible. T.O. Lipton, Inc., Englewood Cliffs, New Jersey. 1976. A booklet that describes how to teach food preparation skills to blind people.

The One Hander's Book, A Basic Guide to Activities of Daily Living. Veronica Washam. The John Day Co., 10 East 53rd Street, New York, NY 10022.

Physically Handicapped: Aids to Self-Help in Homemaking, Grooming, and Clothing. E.S. Hinshaw and D.L. Barrier. Agricultural Extension Service, North Carolina State University at Raleigh, State University Station, Raleigh, NC 27604. $0.25.

Product Inventory of Hardware, Equipment and Appliances for Barrier Free Design. Second edition, 1981. National Handicap Housing Institute, 12 South Sixth Street, Minneapolis, MN 55402.

Rehabilitation Engineering Sourcebook. Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046. 1979.

Rehabilitation for Independent Living: A Selected Bibliography. President's Committee on Employment of the Handicapped, Washington, DC 20402. $4.50.

Self Help Manual for Arthritis Patients. Judith Lannefeld Klinger. Prepared by the Allied Health Profession Section, Arthritis Foundation, 3400 Peachtree Road NE, Suite 1101, Atlanta, GA 30326. Available from Arthritis Foundation, 221 Park Avenue South, New York, NY 10003. 1974. $1.50.

The Source Book for the Disabled. Glorya Hale, editor. Paddington Press, Ltd. Distributed by Grosset & Dunlop, New York. 1979.

Therapeutic Devices, 1956-1976. J. Bellman, et al. American Journal of Occupational Therapy. American Occupational Therapy Association, Inc., 6000 Executive Blvd., Rockville, MD 20852. Do-it-yourself instructions for devices which have appeared in AJOT; includes wheelchair trays, ADL devices, communication aids, etc. 112 pp. 1977.

Toward Independence. The Use of Instructional Objectives in Teaching Daily Living Skills to the Blind. Anne Yeardon. American Foundation for the Blind, New York, New York. 1978.

What You Can Do For Yourself: Hints for the Handicapped. Patricia Galbraith. Drake Publishers, Inc., New York, New York. 1974.

You Can Do It From A Wheelchair. A. E. Gilbert. Arlington House Publications, New Rochelle, New York. 1973.

Other Resources

More information useful to disabled people in their homes is available from these national organizations:

American Council of the Blind
1221 Connecticut Avenue NW
Washington, DC 20036
202/833-1251

American Foundation for the Blind
15 West 16th Street
New York, NY 10011
212/620-2000

American Heart Association
7320 Greenville Avenue
Dallas, TX 75231
214/750-5300

Arthritis Foundation Inc.
1314 Spring Street NW
Atlanta, GA 30309
404/872-7100

National Easter Seal Society
2023 West Ogden Avenue
Chicago, IL 60612

Paralyzed Veterans of America
801 18th Street, NW
Washington, DC 20420
202/872-1300

President's Commission on Employment of the Handicapped
Washington, DC 20402

United Cerebral Palsy Associations, Inc.
66 East 34th Street
New York, NY 10016
212/481-6300

ENVIRONMENTAL CONTROLS AND OTHER ELECTRONIC DEVICES FOR THE HOME

WHAT IS AN ENVIRONMENTAL CONTROL SYSTEM?

"As a result of severe physical impairment, many people are unable to perform tasks normally suited to able-bodied people. When operation of electrical devices is desired, frequently the device or the method of operation can be adapted to fit the capabilities of the physically handicapped.

"An environmental control system permits a physically disabled person to control his or her immediate surroundings without assistance. The person becomes able, independently, to turn lights, radio and television on and off, to answer or initiate telephone calls and to unlock a door. Virtually any aspect of the environment can be controlled depending upon the complexity of the system used. A variety of switches ensures that the equipment can be operated easily regardless of the disability. The objective is to use modern technology to enable physically disabled people to gain greater personal independence, a better quality of life and to add a new dimension to the rehabilitation process.

"The technical components of an environmental control system are the switch, the control box, the feedback information display, and the appliances to be controlled. The complete environmental control system also includes the disabled person and the environment over which he/she is able to exercise control."

from Independence through Environmental Control Systems, Canadian Rehabilitation Council for the Disabled, 1 Younge St. Toronto M5E 1E8, CANADA.

For devices which assist a blind or deaf person to control his/her environment, see **Sensory Aids** in **CONTROL, COMMUNICATION & SENSORY AIDS**.

HOME CONTROL SYSTEMS WHICH HAVE BEEN ADAPTED TO THE NEEDS OF THE SEVERELY DISABLED

"New environmental control systems for the severely disabled which have become popular utilize a controller (energized from a 110 volt outlet) which transmits push-button commands over the house wiring to appliance modules which are also plugged into 110 volt outlets. The controller-module systems* were originally developed for home use by the general public and require no special home installation or wiring. These systems have now been adapted for use by severely disabled persons through the use of rocker, 'puff' and 'sip' switches, or other low force switches.

"The controller-module systems have the advantage of low cost. The following prices are all approximate and as of July 1982. Modules: $17.00 to $20.00 each; four-function controller: $116.00; eight-function controller: $136.00; rocker lever switch: $43.00; 'puff' and 'sip' pneumatic switch: $90.00.

"A few words of caution in the utilization of home controller systems.... "Care must be taken in the handling of the molded plastic controller enclosure which is somewhat fragile and may crack when dropped. When used in an apartment house, it is possible for a controller in one apartment to affect the modules in an adjacent apartment. A wireless intercom system may cause spurious operation of the modules. The system may also be affected by a "noisy" line resulting from the operation of a refrigerator or other motor driven devices. For this reason remotely controlled devices or appliances should be set up so that problem situations cannot occur, for example: If an unused heater has clothing draped over it and is then turned on by remote control, a fire may result.

"It is not recommended that life supporting equipment be controlled from these systems. All appliances should be unplugged from their modules when leaving for a vacation."

* Two of these systems are the System X-10, BSR (USA) Ltd., Blauvelt, NY 10903, and the Home Control System, Leviton Manufacturing Co., Inc., Consumer Products Division, 59-25 Little Neck Parkway, Little Neck, New York 11362.

from A Know-How Manual on Electricity for the Severely Disabled and their Families, pp. 100-102.

A Know-How Manual on Electricity for the Severely Disabled and their Families. A. Auchincloss and M. Youdin. Institute of Rehabilitation Medicine, New York University Medical Center. Rehabilitation Monograph No. 65. 115 pages; $12.00.

"This book has been written to provide enough information for the severely handicapped and their families so that sensible and economically sound choices can be made concerning the electrical assistive systems that will give the greatest independence and improved life style for the disabled persons.

"Severely disabled persons may not have the physical function to perform the operations necessary to do minor electrical work in the home. With some knowledge about the electrical systems in their house or apartment, they can ask and help instruct a family member to make simple repairs. Or, they may decide that professional help is necessary.

"This book attempts to answer most usual questions that people ask about their electrical systems. It also describes various options that a disabled person or his family may choose in order to make his home safer and more convenient. And finally, it describes some basic devices and resources that are particularly useful for those with disability.

"This book also emphasizes safety regulations and precautions both for patients and for those who are making simple repairs. Some of the information presented can be found in other "how-to" electrical books. It is re-stated in laymen's language to give the reader a source of information that is directed specifically to the handicapped and their families."

HOME ACCESS AND MODIFICATIONS

Jim Tobias
Rehabilitation Engineering Volunteer (REV) Network

FUNCTION	DEVICE	COST	NOTES
ENVIRONMENTAL CONTROL	BSR X-10 Standard (see Note 2)	$50-$120	Available in several models: 16-appliance master control or ultrasonic remote control with small, push-buttons similar to a calculator, and mini-controller for 4 appliances, larger and easier buttons. Both versions have bright and dim functions for lights. You need one master and as many modules as appliances as you want to control. Modules to replace wall switches (for overhead lights) are available. Sold as "Plug 'n' Power" "Home Controller."
	BSR X-10 Modified	$160-$240	Can control four or eight devices (2 models). Good rocker-type switch, 4-device master, 3 modules, $190. With 8-device master, $210. Other switches, such as sip-and-puff, can be used. They require a 5-pin DIN plug. Contact BSR or REV Network for wiring information. Available at some medical houses, Prentke-Romich, or BSR, Rt3 303, Blauvelt, New York 109 13, phone (914)358-6060.
	Touchplate Switch	$20/kit	Available from Heath-Kit (see phone for local store) or other electronics sources. Relatively easy to build with soldering iron, a few tools. Plug appliance into switch box, plug switch box into wall. Current limits are: Lamps & Heaters = 300 watts TV Receivers = 225 watts Fans, Blowers, etc. = 180 watts Small metal disk can be placed anywhere, requires just a light touch to turn device on or off. Can use more than one in the same dwelling. Not recommended for radios and some stereos, due to audio interference.
	Whistle Switch	$20	Available from electronics or some department stores, also Carol Wright Gifts, Box 8502, Lincoln, NB 68544; or Neil Henson Co., Box 132, Jackson, MO 63755. As above, plug appliance into wall. Transmitter is really squeeze whistle. Device may be triggered accidentally by jangling keys, dog whistle, etc. Only one per room. Do not use with a dog in the house.
	Computer environmental controls	$100-$400	All brands of home computers now offer plug-in peripherals designed to work the BSR modules described above. If you use a computer already, this may be an inexpensive way to go. Cast-off low-cost computers can also be found as donations. Some software is available to make these easy to use. See Trace Center's International Software/Hardware Registry. Contact REV Network for suggestions and software help.
TELEPHONE	Various Dealers	$40-$120	Many electronic outlets offer automatic dialers, which can store 5-40 commonly used phone numbers, recalled and dialed automatically. Some can repeat dial if there is a busy signal; some are complete with telephone handsets and touch-tone pads. Radio Shack sells one for 16 numbers for $50.00.

FUNCTION	DEVICE	COST	NOTES
TELEPHONE, cont.			Suggestion: Check all local stores and try them all out; don't buy more storage than you really need.
	Phone Directories	$6-$25	Stationary stores, Radio Shack sell motorized personal phone directories that can hold several hundred names and addresses; they operate by push-button to either scroll or flip pages like a Rolodex. Perfect for other uses, such as work-place modifications.
	Amplifiers	$10-$150	"Speaker phones" can be obtained from the telephone company, and many electronics stores sell them. Depending on your set-up, an inexpensive model may work. Beware of feedback and loud background noise; try them out if you can. Panasonic makes attractive model for about $100.
	Cordless Telephones	$50-$200	These are mobile phones with a stationary base unit. You can mount the portable part on your wheelchair for hands-free private conversation (an advantage over speaker phones). Find a model with a hand-up/lift-up switch you can use, or modify it. Prices of the models are indicative of reliability, range, and resistance to interference. Beware of the cheapest ones. (See warning on cordless phones)
	Visual Phone	$20	Radio Shack offers a "Fone Flasher" which lets you you connect a lamp (or whatever) to your phone line such that when your phone rings, the lamp flashes.
TELEVISION	Mechanical Channel Selector	$17	This is a mechanical device that attaches to the stem of the channel knob. A long cable like the one on a bicycle brake runs to a hand-held unit that has a rotary lever. To operate, you turn the lever; it takes a good amount of force. It would be possible to extend the lever arm to minimize force required. Another disadvantage is having the cable lying around and getting in the way. No permanent modification to the TV, and you can move it from one set to another. Available from Star-crest of California, 3159 Redhill Avenue, Costa Mesa, California 92626. Get their catalog before you order, or contact manufacture: RAMCO, 7271 N Cicero, Lincolnwood, Illinois 60646.
TELEVISION, cont.	Electronic Channel Selector	$60-$120	Available in at least two models from Jerrold, should be at your local TV repair or specialty store. Both models are remote-wired push-button channel changers, one for standard broadcast, the other for cable. Easy to install. You ca put the box wherever you want it. Buttons are relatively stiff. No commercially available keyguards.
UNLOCKING DOOR	Electric Door Lock		Available through average lock shop. Manufacturer is Trine Company. Many models available.
	1. Electric Strike	$25-$30	If you are installing it yourself, you will need good tools and good measurements. Lock shop will charge $7.50 to install it.
	2. Transformer 12 VAC, 1 amp	$10	Should be enclosed in chassis box and equipped with a 2 amp fuse (slow blow).

82

FUNCTION	DEVICE	COST	NOTES
UNLOCKING DOOR cont.	3. Radio Control	$40-$90	Generally, the more expensive ones have more codes on the transmitter for more security. Sears garage door kits cost $75.00 for transmitter and receiver. (See Note 1.)

NOTE 1: Test transmitter and receiver before mounting. Be sure user can operate transmitter button, or modify it with a big plastic plate, etc. Mount the receiver near the door. User can probably push door easily; make sure he/she can pull door (as is, with a door knob strap, or convenient pulley arrangement).

NOTE 2: Some disabled people may be able to use the standard models, with or without a keyguard (not commercially available). Modified design has no ultrasonic remote control. These devices are inexpensive, but they have some drawbacks: limited current (no heaters or air conditioners, for example); interference (from wireless intercoms, heavy motors, etc.); but they are easy to install and change, since they plug into the wall outlets.

GENERAL INFORMATION

Knobs: Sometimes all you need is a big knob to fit the same control stem. Most TV and radio repair shops have a box of junk just for this: old knobs, plastic parts, etc. Bring your knob to ensure a match in sizes. If that doesn't work, glue or screw an extender arm onto the knob.

Switches: Toggle switches can be adapted with a short length of stiff plastic or metal tubing to add leverage. You may have to replace the switch, however. Make sure you get on that matches the chassis hole size, current limit, number of poles, type of activation, etc. Ask for help at an electronic store.

Pushbuttons: A small pushbutton can be adapted by using a flat lever over the button to make a bigger "target", or by gluing on a slightly larger plastic plate, or by putting a sort of keyguard on the chassis if the problem is hitting more than one button at a time. Otherwise, you may have to replace the button with a bigger or softer-action one. See above for matching information.

Where To Get Help

- Put up a sign in an electronics shop
- Trade unions (ask about retired workers, apprentices)
- High school shop department
- Telephone Pioneers (call telephone company business office for their number)
- Vocational schools
- Local technology companies (try the public relations office)
- Colleges, especially engineering and industrial design departments
- Special education schools
- Computer user groups

Remember, with all of these people, make sure you define the problem and keep tabs on their designs. These little gadgets should be cheap, unbreakable, attractive, and useful. Only the user can guarantee use. Often people doing a project as a hobby want to experiment with components and devices for their own amusement. That's okay, but it shouldn't get in the way of the service you are requesting.

If you turn up a "live one," someone competent and attuned to the user's needs, cultivate them. Also, have them contact us for information exchange.

Jim Tobias
Rehabilitation Engineering Volunteer (REV) Network
201 W. 85th Street #2E
New York, New York 10024
212/874-0312

Also see sections on **CONTROL**, **COMMUNICATION**, **MICROCOMPUTER APPLICATIONS**

A **CONSUMER ALERT** was reported by Judy Berke in the April 1984 issue of The Coordinator Magazine.

CONSUMER ALERT

"We have received communiques from some readers telling us about repair problems in electronic protection systems. These are the systems in which a device -- either part of a "terminal" or worn as a pendant -- signals a self-dialer to connect into a hospital, police station or central computerized office. or worn as a pendant -- signals a self-dialer to connect into a hospital, police station or central computerized office. (The devices can be either one or two way.) Most of these systems seem quite valuable to the elderly or infirm who spend a lot of time alone.

"However, it now seems that many of the systems are sold by 'independent' operators. In some of these cases, neither the sales person nor the parent company is taking true responsibility for repairs, service and replacements of the system, although some of them offer what looks like a good warranty -- until the customer needs to use it. Then the complications begin.

"If you or any of your patients are contemplating the lease or purchase of one of these systems, ask the following questions:

1. How long is the warranty, and does it cover both labor and parts?
2. Where will the repairs be made? If the location is in another town, is postage or shipping covered in the warranty?
3. Will the local rep pick up the machine for mailing? (Sometimes it is difficult for a patient or older person to get to a post office.)
4. Will the rep or company supply a 'loaner' while the system is being repaired?
5. Is reprogramming of the machine (usually phone numbers) difficult? Can the consumer do it? If a service rep must reprogram, can it be done in the home or must the machine be transferred somewhere else? If reprogramming must be done by special equipment, does the local rep have that equipment? In either case, again, if the machine will be out of order for any amount of time, is there a loaner?
6. If the representative ceases to handle the equipment, is there another representative in the area who will take over service?

"These questions arise because of past problems some of our readers have had with servicing of their protective systems. Most of the systems we have seen seem to be of excellent quality, but quality is also measured by service reliability and consumer safety. Quality is certainly not indirected [sic] if one is without the system because of repair or reprogramming service problems."

Reprinted with permission from The Coordinator Magazine, 11417 Vanowen Street, North Hollywood, CA 91605, 818/765-1575.

WARNING ON CORDLESS TELEPHONES

The following warning on cordless telephones, by Congressman Henry A. Waxman, appeared in The Coordinator, April 1984.

"Users of cordless or portable telephones should always make certain that the phone is in the 'Talk' position before bringing the phone to their ear. Should the phone ring while still in the 'Listen' position, the user may be exposed to an extremely loud ring.

"Some cordless phone users have complained that the ring was so loud as to be painful. Some doctors speculate that the ring might result in some hearing loss.

"To file complaints or obtain additional information, consumers should call the Consumer Product Safety Commission toll-free hotline at 1-800-638-CPSC. The teletypewriter number for the hearing impaired is 1-800-638-8270."

Reprinted with permission from The Coordinator Magazine, 11417 Vanowen Street, North Hollywood, CA 91605, 818/765-1575.

Some Publications on Environmental Controls and Accessible Home Hardware

"Design Considerations for an Environmental Control System for the Severely Handicapped." R. Block. Proceedings of the Seminar on Electronic Controls for the Severely Disabled, Vancouver, B.C., Canada, 1974. The Kinsmen Rehabilitation Foundation of British Columbia, 2256 W. 12th Ave., Vancouver, B.C. V6K 2N5, Canada.

Design for Accessibility: Equipment and Aids Catalog, revised 1981. Michigan Center for a Barrier Free Environment, 6879 Heather Heath, West Bloomfield, MI 48033, $20.00.

Design for Independent Living. Raymond Lifchez and Barbara Winslow. Watson-Guptill Publications, 1515 Broadway, New York, NY 11036. 1979. 208 pages. $25.00 (also available in soft cover).

Environmental Control Systems and Vocational Aids for Persons with High Level Quadri-plegia. Institute of Rehabilitation Medicine, New York University Medical Center, Rehabilitation Engineering Center, 400 E. 34th Street, New York, NY 10016. 1979. Clinical evaluation of electronic devices.

Home Security. Time-Life Books Home Repair and Improvement Series. Time-Life Books, Alexandria, Virginia. 1979. 136 pages. $11.95. The section on accident-proofing a house includes 13 pages of directions and sketches for diminishing the dangers of bathrooms and stairs. Includes installation of grab bars, creating a slip resistant surface, adding a rail to a stairway wall, and building an outdoor access ramp.

Housing Interiors for the Disabled and Elderly. Bettyann Raschko. Von Nostrand Reinhold, New York, NY. 1982. 360 pages. $34.50.

How to Build and Use Electronic Devices without Frustration, Panic, Mountains of Money, or an Engineering Degree. Stuart A. Hoenig. Little, Brown, & Company, Boston, Massachusetts. 1980.

How to Create Interiors for the Disabled: A Guidebook for Family and Friends. Jane Randolph Cary. Pantheon. 128 pages. $5.95. 1978.

Independence Through Environmental Control Systems. David Symington, et al. Canadian Rehabilitation Council for the Disabled, 1 Younge St. Suite 2110, Toronto, Ontario M5E 1E8, CANADA. 64 pages.

Installing Your Own Telephones. Reston Publishing Company, Reston, VA. 168 pages. Available from local Radio Shack, $5.95. 1983. Well-illustrated, step-by-step installation instructions that are easy to read and understand.

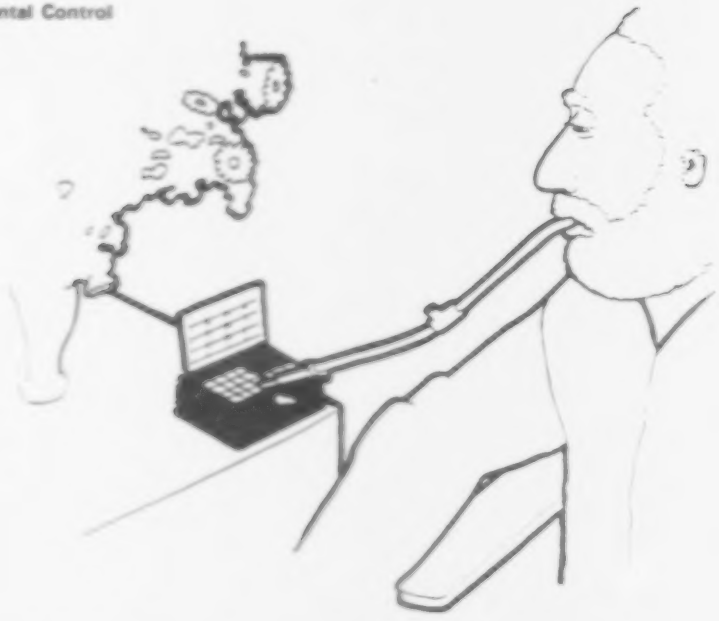
Manual on Management of the Quadriplegic Upper Extremity. Available from: Fred Sammons, Inc., Brookfield, Illinois. 201 pages. 1978. Includes a section on environmental control systems, wheelchair control systems and criteria for selection of orthoses, controls and power sources.

Product Inventory of Hardware, Equipment, and Appliances for Barrier-Free Housing Design. National Handicap Housing Institute, Inc., 12 S. 6th Street, Suite 1216, Minneapolis, MN 55402. 1981. The section on Hardware (pp. 193-276) covers door levers, door and cabinet pulls, hinges, automatic doors, shelf brackets, grab bars.

Film

The Box and I. Canadian Rehabilitation Council for the Disabled. Available from: Marlin Motion Pictures, 1 Younge Street, Suite 2110, Toronto, Ontario M5E 1E8, Canada. 16 mm color, 22 1/2 minutes. 1978. Illustrates the use and benefits of environmental control units in various settings.

Environmental Control



Mouthstick and holder allow use of inexpensive general consumer marketplace environmental control unit (BSR-10).

Drawing reprinted from: **A Guide to Controls**, Children's Hospital at Stanford.

Home Access

Bracket and transmitter allow independent home entry, using garage door opener modified for front door use.

Drawing reprinted from: **A Guide to Controls**, Children's Hospital at Stanford.

Educational and Vocational Technology

EDUCATIONAL AND VOCATIONAL TECHNOLOGY 73

TECHNOLOGY IN THE CLASSROOM 75

INTRODUCTION 75
TECHNOLOGY SERVICE DELIVERY 75
PROJECT TEACH: A MODEL PROGRAM 75
ORGANIZATIONS 76
RESOURCE CENTER 77
EDUCATIONAL AIDS INFO RESOURCES 78
MANUFACTURERS 78
ORGANIZATIONS 78
DATABASES 78
RESOURCES 79

VOCATIONAL EDUCATION 82

TECHNOLOGY AT THE WORKPLACE 85

INTRODUCTION 85
COSTS 85
WORKSTATION DESIGN 85
THREE CASE STUDIES 89
FARMING 90
A RESOURCE FOR DEVELOPING ACCESSIBLE JOBSITES 91
TECHNOLOGY FOR EMPLOYMENT: RESOURCES 91
ORGANIZATIONS 91
GROUPS CONCERNED WITH COMPUTER EMPLOYMENT 92
SELECTED PUBLICATIONS 99
PUBLICATIONS 99
PERIODICALS 101
CATALOGS AND DIRECTORIES 102

INTRODUCTION

Technical aids can be beneficial to students at all levels of the education process, from kindergarten to post-secondary. In the existing literature, the emphasis for the elementary school child seems to be on finding the most appropriate aid for communication, positioning, mobility, and self-care. A good deal of the literature focuses on the most severely disabled children, and the emphasis tends to be on personal aids for the individual child. As the high school years are reached, and it is assumed that basic needs are met, the approach changes to finding technology to make the classroom useable for the disabled teenager. This same orientation holds through the college years, with increase emphasis on making the entire campus accessible.

This section contains references to all three stages. It is hoped that those seeking information about technology that can aid education will look beyond their immediate target age range or disability. There is benefit to be gained in crossing disciplines. You may find that you can readily apply much of this information to your own area of interest.

There are some glaring gaps in the literature. I would like to find more information about adapting existing classrooms at the primary school level, and about approaches to meeting basic needs, such as mobility and written communication, for the secondary school age group. Additionally, there is a dearth of information about how devices could be better used by less severely disabled kids. Attention to the benefit to be gained from applying technology in all three areas relevant to education -- person, classroom, and campus -- needs to occur throughout the education process, not one step at a time. (editor)

TECHNOLOGY SERVICE DELIVERY

"...for this technology to be most beneficial, an effective and coordinated delivery system of technological services is essential. The objective is to assure that students in need of adaptive aids and equipment have access to them and are trained in their most efficient use.

"In the past, a variety of agencies have been involved in securing assistive devices for handicapped children, ranging from Easter Seal Societies and the March of Dimes to service clubs and others. With the advent of federal and state mandates and funding, university programs, hospitals and rehabilitation centers, state and local education agencies, and regional resource centers have also become concerned with service delivery. This has resulted in an increase in the availability of services, but also in a real concern that such fragmented, piecemeal service might be neither comprehensive nor cost-effective.

"Although there have been significant technological advances in the development of assistive devices, there still remains the task of assuring that they become available to those persons who could benefit from them. To accomplish this goal, it is essential that all related disciplines -- researchers, engineers, educators, manufacturers, therapists, and medical personnel [and parents] -- coordinate their efforts on a statewide and national basis."

Assistive Devices for Handicapped Students: A Model and Guild for a Statewide Delivery System, 1980. National Association of State Directors of Special Education, 1201 16th Street NW #610E, Washington, DC 20036.

ARE WE LOOKING FOR PROBLEMS?

Joseph J. Stowitschek adds a voice of concern in the forward to that issue.

"As we develop technology, we must continue to ask ourselves: Are we developing, testing, and using technology to solve problems? Or, heady with enthusiasm, do we produce solutions for which we must then find problems? For instance, the growing interest in microcomputer assisted instruction may tend to foster the development of a solution for which a problem must then be located. In this mood of enthusiasm over the technology itself, we tend to treat each technological device as an entity in and of itself, instead of as part of a whole range of instructional options. The questionable logic behind this tendency is as follows: "The (microcomputer) is becoming popular and can be used to teach. We need assistance in teaching handicapped children; therefore, the (microcomputer) should be used to teach (_____) skills to (_____) children." Instructional alternatives should not be ignored."

Technological Advances in Special Education, the Winter 1984 issue of Exceptional Education Quarterly.

PROJECT TEACH: A MODEL APPROACH

"The provision of appropriate technical aids within an educational setting can have a profound impact on improving the educational achievement experienced by severely handicapped children. In some cases, the support of technical services can lead to the mainstreaming of children that otherwise would not be candidates.

"Technical aids can assist the handicapped child to actively participate in the educational program. Federal and state policy makers need to be made aware of the potential of technical resources to supplement the goals mandated by Public Law 94-142 -- Education of the Handicapped Act -- so that these resources can be planned into budgetary allocations for implementation in the future."

Project TEACH (Technical Educational Aids for Children with Handicaps) was a cooperative project by Memphis City Schools Division of Special Education and University of Tennessee Rehabilitation Engineering Program that developed a model program for providing appropriate technical aids within a regular educational setting in 1978-1981.

The following summary comments on technical components of the project are taken from the final report.

The provision of technical aids, whether it be a commercially available device, a modified commercial device, or a custom-designed device, should be preceded by a multi-disciplinary evaluation in which the abilities, potential, and needs of the child are carefully defined.

When attempting to meet the educational needs of severely handicapped children, commercial technical devices as the sole source will rarely be sufficient to meet the wide ranging needs of these children. Additional technical resources which will permit the custom modification of commercial devices and/or the design of unique customized devices will be necessary.

The provision of specialized technology, upon which the child and the special educator become dependent, must be supplemented by a maintenance and repair capability that can rapidly respond to malfunctions or breakdowns in the equipment.

The more sophisticated the technology, the more essential the need for liaison personnel to explain the operation and features of the devices, and provide immediate support if it appears that the "gadget tolerance" of the teacher or student is being exceeded.

That there be a person or persons within the educational setting that have been assigned the responsibility for the ongoing evaluation, updating, maintenance, trouble-shooting and liaison related to the technical aids being used by children and teachers in the educational setting.

Liaison support be provided to facilitate the mainstreaming of children with specialized technical aids, especially during the critical periods when the child first enters the regular classroom.

That the necessary arrangements be made, particularly related to seating, powered mobility, and communication aids, so that a child can benefit from the devices during evenings, weekends, and summer vacations; i.e., so that the devices can truly become integrated into the child's total activities.

That the most expensive devices are not necessarily the most appropriate devices; i.e., there is no linear relationship between cost and effectiveness. When all factors are considered, the choice of the most appropriate aid is based on the child's abilities, potential and needs, and not on the potential offered by the features of a sophisticated device.

Since breakdowns with lengthy repair delays can severely interrupt and demoralize a student, durability of equipment should be a major consideration during the evaluation and equipment selection process.

Routine maintenance and repair of technical devices is necessary for their proper functioning. Our experience indicates an additional 10% expense above cost of provision of technical aids should be budgeted for this ongoing maintenance and repair.

The full report is available for $5.00 from Memphis City School, Division of Special Education, 2597 Avery Avenue, Memphis, TN.

A movie about the project, "A Special Magic," is also available.

Also see Service Delivery Models, page 257, in the section on **FUNDING, MODELS, POLICY, STATISTICS**.

ORGANIZATIONS

These groups have a particular interest in disabled children and technology in the classroom.

Artificial Language Laboratory
Department of Computer Science
Michigan State University
East Lansing, Michigan 48824
512/332-1970

Assistive Device Center
California State University-Sacramento
6000 J Street
Sacramento, California 95819
916/454-6916

Children's Hospital at Stanford
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, California 94304
415/327-4800

The Communication Aids and Systems Clinic
University of Wisconsin-Madison
1500 Highland Avenue
Madison, Wisconsin 53705
608/263-7726

Educational Technology Center (ETC)
Box 64
Foster, Rhode Island 02825
401/822-4622

The Non-Oral Communication Center
Plavan School
9675 Warner Avenue
Fountain Valley, California 92708
714/425-6220

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8
Canada
416/425-6220

PAM Assistance Centre
601 W. Maple Street
Lansing, Michigan 48909
517/371-5897

Tufts University
Rehabilitation Engineering Center
171 Harrison Street
Boston, Massachusetts
617/956-5036

University of Tennessee
Rehabilitation Engineering Center
682 Court Avenue
Memphis, Tennessee 38163
901/528-6445

Also see **Service Centers** in the sections on **Seating** and **Communication**.

A RESOURCE CENTER AND DATABASE PROVIDING EDUCATIONAL AND VOCATIONAL ACCESS TO TECHNICAL FIELDS FOR PERSONS WITH DISABILITIES

"Students with disabilities are underrepresented in the fields of science and engineering. One reason for this is a lack of information regarding methods by which they can complete educational programs (particularly involving laboratories) and successfully complete careers. Specifically, information regarding adaptive equipment, altered instructional formats and resources appropriate to aiding students and faculty is not readily available to these people. All too often, college students with disabilities are advised against entering specific fields or taking certain classes for fear their disability will present them from full participation.

"Much of this situation is the result of 1) lack of knowledge regarding adaptive aids, and 2) the failure to procure or develop/modify aids in time for the student to access the class or the employee to meet job requirements. The irony and indeed tragedy of this situation is that an abundance of information on aids exists. Rehabilitation professionals are virtually inundated with information on new products from a variety of sources, including conferences, workshops, computer fairs and expositions. With this information explosion, the problem is one of information storage and retrieval.

"As a response to these problems, we developed a resource center, including a computer database, that provides information helpful to disabled individuals desiring to study science or engineering."

From a paper by Helen E. Woodall and Albert M. Cook in the Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, 1983.

The database is now available to other institutions and the general public; see **ADDS** in the **INFORMATION RESOURCES** section, page 9.

EDUCATIONAL AIDS INFORMATION RESOURCES

MANUFACTURERS OF CLASSROOM AIDS

For information on **Manufacturers & Distributors** of equipment for children and the classroom, see **AbleData Information System**.

ORGANIZATIONS

Council for Exceptional Children (CEC)
1920 Association Drive
Reston, VA 22091

For more information on CEC, see the **Microcomputer Applications** section, page 243.

HEATH (Higher Education and the Handicapped) Resource Center
One Dupont Circle NW
Washington, DC 20036
202/833-4707 (voice/TTY)

The HEATH Resource Center is a national clearinghouse on postsecondary education for disabled people. A program of the American Council on Education, it is funded by the U.S. Department of Education. It publishes a regular newsletter.

National Association of State Directors of Special Education (NASDSE)
1201 16th Street NW, Suite 610E
Washington, DC 20036

Technology and Media for Exceptional Individuals
Charles MacArthur, Membership Chairperson, TAM
Institute for the Study of Exceptional Children
Department of Special Education
University of Maryland
College Park, MD 20742

Technology and Media for Exceptional Individuals (TAM) is an international organization which facilitates closer relationships between educators and others concerned with the application of technology to meet the needs of gifted persons, senior citizens and individuals experiencing handicaps. TAM, a division of the Council for Exceptional Children, will develop new technologies and will disseminate this information through professional meetings, training programs and publications. The organization will also cooperate with education and government agencies as well as business and industry in research, demonstration, review and validation, among other professional studies.

TAM will publish a journal and newsletter, conduct training programs, conferences and workshops, and develop a new technology and media network. It also plans to evaluate and field test equipment and software.

The Association for the Severely Handicapped (TASH)
1600 W. Armory Way
Seattle, WA 98119
206/283-5055

Information and materials requests on all aspects of education and services for people who are severely handicapped are answered by TASH's Information Department. TASH maintains a library of resource materials. The Information Department also conducts surveys of integrated schools and parent needs.

DATABASES AND INFORMATION NETWORKS

These systems have a strong educational focus. For more information on these and other electronic information exchanges, also see **Information Resources** and on **Microcomputer Applications**.

The Assistive Device Database System (ADDS)
American International Data Search, Inc.
2326 Fair Oaks Boulevard, Suite C
Sacramento, CA 94825
916/925-4554

Handicapped Education Exchange (HEX)
11523 Charlton Drive
Silver Spring, MD 20902
301/681-7372

HEX is a computerized bulletin board, available through the public telephone network. It is primarily intended as a free service to those involved in the education of, or communications with, the handicapped. HEX serves as a means of exchanging ideas and information concerning application of technology to aid the handicapped.

Handicapped Learner Materials Distribution Center
Audio-Visual Center, Indiana University
Bloomington, IN 47405
812/337-1511

The Handicapped Learner Materials Distribution Center (HLMDC) is a part of the Special Materials Project established by Indiana University. HLMDC loans, free (except for return postage), selected materials such as films, videotapes, kits, games and adaptive devices relevant to the general special education population. Materials are divided into three collections represented by separate catalogs: 1) teacher training materials in special education and media production (mostly of 16mm films); 2) handicapped learner collection (mostly classroom curricular materials, primarily for examination and evaluation); and 3) videotapes that are duplicated into other formats at cost. These services are available to anyone in the USA involved with education a handicapped learner.

SpecialNet

SpecialNet, a special education communication information network, is part of a computer network accessed by a terminal with telephone communication capability. It provides information on special education, improving programs and skills, and a network of educators and organizations involved in special education. It also features personal correspondence and information retrieval access to major databases, as well as data collection and information management systems. At least two of sections of SpecialNet will be focused on technical aids: **EDUTECH** and **ASSISTIVE DEVICES**.

TECHNOLOGY IN THE CLASSROOM: RESOURCES

Able Scientists -- Disabled Persons: Biographical Sketches Illustrating Careers in the Sciences for Able Disabled Students. S. Phyllis Stearner. Foundation for Science and the Handicapped, 154 Juliet Court, Clarendon Hills, IL 60515. 312/323-4181. $12.95. The major objectives of this publication are to illustrate possible career options open to physically disabled students and to encourage teachers, counselors and parents to help scientifically talented and disabled students to get the education they need to prepare for scientific careers.

Accommodating the Disabled Student. James Mueller. Job Development Lab, George Washington University Rehabilitation R&T Center, 2300 Eye Street NW, Suite 714, Washington, DC 20037. $10.00. 1981.

Adaptive Equipment for the Handicapped Student: A Resource Manual. Michigan Alliance of PHysical and Occupational Therapists, c/o Wing Lake Center, 6490 Wing Lake Road, Birmingham, MI 48010. $8.00. 1982.

Aids for Handicapped Readers. Reference and Information Section, Division for the Blind and Physically Handicapped, Library of Congress, Washington, DC 20542. Free. Devices and techniques for handling books, writing, and typing.

Aids to Independent Living: Self-Help for the Handicapped. Edward Lowman, MD and Judith Klinger, OTR. McGraw-Hill Book Company, New York, NY. 1969. (Out of print, but usually available in OT/PT departments.)

Aids for the Severely Handicapped. K. Copeland. Spector Publishing Co., Ltd., London, England. 1974. This book is often referred to; however, it is quite out of date.

Assistive Devices for Handicapped Students: A Model and Guide for a Statewide Delivery System. NASDE, 1201 16th Street NW, Washington, DC 20036. 27 pages. $4.50. 1980.

Auxiliary Aids: A Resource Guide for Postsecondary Schools, Rehabilitation Agencies, and Handicapped Individuals. Office of Handicapped Concerns, United States Education Department, Washington, DC 20202. Free. 1980.

Bibliography of Children's Books About Disabilities. Pediatric Projects, Inc., P.O. Box 1399, Santa Monica, CA 90406. No charge.

Biology for the Blind. Dorothy Tombaugh. Available from: ERIC Document Reproduction Service, P.O. Box 190, Arlington, VA 22210. 1973.

Captioning: Shared Perspectives. Proceedings of a National Captioning Conference, June, 1978. National Technical Institute for the Deaf, Rochester Institute of Technology, Rochester, NY. Available from: National Technical Information Services, 5285 Port Royal Road, Springfield, VA. 1981.

Classroom-Made Movement Materials. Tom Hall. $6.95. From: Front Row Experience, 540 Discovery Bay Blvd., Byron, CA 94514-9454. 415/634-5710. Easy "how to" illustrated instructions for making and using simple, inexpensive, and effective perceptual-motor equipment right in the classroom. Preschool, elementary and special ed students make and have fun using Pocket Parachutes, Zoomers, Touchy Bags, Funny Feet, Handy Hands, Footsies, Deck Rings, and on and on.

Communication Outlook. Quarterly publication. Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824.

Creating an Accessible Campus. Maggie Coons and Margaret Milner. Association of Physical Plant Administrators of Universities and Colleges (APPA), 11 Dupont Circle, Washington, DC 20036. $12.50. 1979.

The Disabled Child. Equipment for the Disabled series. National Fund for Research Into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, Sussex BN4 2BB, England.

Educational Products for the Exceptional Child. Shellie Roth, editor. A catalog of products funded by the Bureau of Education for the Handicapped. Oryx Press, Phoenix, AZ. 987 pages. 1981.

Educators with Disabilities: A Resource Guide. Joanne Gilmore, Diane Merchant and April Moore. American Association of Colleges for Teacher Education (AACTE), One Dupont Circle, Washington, DC 20036. Available from: U.S. Government Printing Office, Washington, DC 20402. 1981.

Environmental Design for Handicapped Children. J.S. Sandhu & H. Hendricks-Jansen. Gower Publishing Co., Brookfield, VT. Recommends improvements in the environment of the child with severe disability. Discusses design criteria for architectural and environmental elements, and problems of adapting existing facilities. A separate section deals with "inflatables." Appendices treat design and construction of worktables, mobiles, displays, partitions, etc.

Fact Sheet: Access to the Science Laboratory and Classroom. M. Zimmerman, M. R. Redden, S. B. Forman, Editors. HEATH Resource Center, One Dupont Circle, Washington, DC 20036. Directed towards disabled high school and college students, science instructors, and college administrators, this sheet provides advice and encouragement on making the science lab and classroom accessible to disabled students. Includes examples of coping strategies, disability-related accommodations with references, and selected resources.

Functional Aids for the Multiply Handicapped. Isabel Robinault. Medical Department, Harper & Row, Hagerstown, MD. 1973.

A Guide to Developing a Classroom Curriculum for Visually Impaired Multihandicapped Infants. Stocking Publisher, 1350 South Kostner Avenue, Chicago IL 60023.

Handicapped... How Does It Feel. Gregory La More. B.L. Winch & Assoc., 45 Hitching Post Dr., Rolling Hills Estates, CA. 70 pp. $5.95. 1981. A program for the classroom teacher to help able-bodied students understand how it feels to be handicapped. Written at second/third grade level in large type with many pictures. Section on how special equipment helps disabled children.

Higher Education and the Handicapped Resource Directory. HEATH Resource Center, American Council on Education, One Dupont Circle, Washington, DC 20036. 202/833-4707 (voice/TDD). Free. 1982.

Inexpensive Movement Materials. Tom Hall. Front Row Experience, 540 Discovery Bay Blvd, Byron, CA 95614-9454. 415/634-5710. $6.95. Follow-up to Classroom-Made Movement Materials (listed above). Includes all new movement materials that are not only inexpensive, but fun to use and easy to make with simple illustrated instructions. Guidebook is loaded with plenty of fun-filled illustrated activities for Tilt-O-Board, Roll-O-Balance, Batting Tees, Color Squares, Dexterity Rod, Flying Foam Saucers, Isobands, and much, much more.

"How We Do It". Journal of College Science Teaching. National Science Teachers Association (NSTA), 1742 Connecticut Avenue NW, Washington, DC 20009. Volume X No. 6, May 1981.

Mainstreaming: Practical Ideas for Educating Hearing-Impaired Students. Milo E. Bishop, Editor. Alexander Graham Bell Assn. for the Deaf, Inc., 3417 Volta Place NW, Washington, DC 20007. $10.95. 1979.

Management of Accessibility for Handicapped Students in Higher Education. David W. Jacobson. National Association of College and University Business Officers (NACUBO), One Dupont Circle, Washington, DC 20036. 1981. Available from: U.S. Government Printing Office, Washington, DC 20402.

Materials and Aids for Special Education. Danish Folk-School's Materials and Aids Research Centre, Herning, Denmark. Also available from NARIC. 1982. Catalog of teaching materials and aids for disabled students, including aids and machinery for learning, solo-performance aids, furniture and related accessories, domestic science aids, school subject materials and training materials. Includes drawings.

Meeting the Needs of the Handicapped: A Resource for Teachers and Librarians. C.H. Thomas and J.L. Thomas, editors. Oryx Press, Phoenix, AZ. 440 pages. 1981.

The Modification of Educational Equipment and Curriculum for Maximum Utilization by Physically Disabled Persons: Educational and School Equipment for Physically Disabled Students. Human Resources Study Number 9. Human Resources Center, Albertson, NY. 1967. Discusses non-limiting school equipment and attempts to provide guidelines for modifying and selecting equipment that presents no barriers or removes barriers for disabled students. Examples from the experiences of the Human Resources School are presented. To be used in coordination with other volumes in the series on school design, transportation of disabled students, staffing, and curriculum and instructional techniques. Includes bibliography.

Modifying the Existing Campus Building for Accessibility: Accessible Products Catalog; and Construction Guidelines and Specifications. Stephen Richard Cotler. Association of Physical Plant Administrators of Universities and Colleges (APPA), 11 Dupont Circle Washington, DC 20036. 1981.

Multi-Sensory Educational Aids from Scrap. Kendrick Coy. Charles C. Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, IL 62717. 216 pages. 1980. Describes learning tools for disabled children that can be developed by parents, teachers, therapists and others at low cost from scrap or inexpensive materials. Patterns and instructions are included for language, mathematics, and science aids.

Perceptual-Motor Development Equipment: Inexpensive Ideas and Activities. Peter Howard Werner & Lisa Rini. John Wiley & Sons, Inc., 605 Third Avenue, New York NY 10016. 194 pages. 1975.

Ready, Willing and Disabled. Norman Kunc. Personal Library Publishers, Suite 439, 17 Queen Street East, Toronto, Canada M5C 1F9. 111 pages. $7.95. 1981. Describes the process of integrating a physically handicapped student into the regular school system. Includes specific suggestions for equipment and adaptations for classes in math, social science, electives, etc. Written by a college youth with cerebral palsy who entered mainstreamed programs at age 3.

Rehabilitation Engineering Sourcebook. Institute for Information Studies, 400 N. Washington Street, Falls Church, VA 22046.

Science for the Handicapped: An Annotated Bibliography. Ben Thompson, editor. Science for the Handicapped Association. Available from: SMEAC Information Reference Center, Ohio State University, 1200 Chambers Road, 3rd Floor, Columbus, OH 43212. $3.50. 1980.

Special Education in Transition (No. 2), Education Hard of Hearing Children. Mark Ross and Linda W. Nober, editors. Alexander Graham Bell Assn. for the Deaf, 3417 Volta Place NW, Washington, DC 20007. 128 pages. $9.50. 1981.

Special Technology for Special Children: Computers to Serve Communication and Autonomy in the Education of Handicapped Children. E. Paul Goldenburg, Ed.D. University Park Press, 300 N. Charles Street, Baltimore, MD 21201. 183 pages. $12.95. 1979. Emphasis is on how the computer can become the tool of the child instead of the tool of the teacher. Instead of the computer being used as a medium for a program designed by the teacher to lead the child through a sequence of steps to learn some desired behavior, this author views it as a prosthetic medium through which the child can explore. A discussion of the use of the computer language LOGO for exploration by handicapped children is a major focus of the book.

Teaching Biology to Visually Handicapped Students: Resource Manual. Kenneth S. Ricker. Department of Science Education, University of Georgia, Athens, GA 30602. Free. 1980.

"Teaching Chemistry to the Physically Handicapped". Journal of Chemical Education. American Chemical Society. 58, No. 3, March 1981. Available from: Subscription and Fulfillment Dept., 20th and Northampton Sts., Easton, PA 18042

Teaching Chemistry to Physically Handicapped Students. Kenneth M. Reese, editor. American Chemical Society, Committee on the Handicapped, 1155 16th Street NW, Washington, DC 20036. Free. 1981.

Teaching Physically Handicapped Children: Methods and Materials. Harold D. Love. Charles C. Thomas, Publisher, 2600 S. First Street, Springfield, IL 62717. 176 pages. $15.75. 1978. An informational as well as a resource book including chapters on disabling conditions, educational goals, and architectural barriers in schools.

"Technological Advances in Special Education." Exceptional Education Quarterly, Vol. 4, No. 4, Winter 1984. James M Kauffman, Journal Editor; Joseph J. Stowitschek, Issue Editor. This issue offers an array of articles on technology applied to special education. Some are devoted to the problems that must be addressed in current and future applications of instructional technology; some describe the use of technology to solve particular problems in educating handicapped persons; and still others describe the coming generation of technological devices for which the problem solution potential is only now being demonstrated.

Test Adaptations for the Handicapped. P. Wassan, T. Tynan and P. Gardiner. Education Service Center, Region 20, 1314 Hines Avenue, San Antonio, TX 78209. August, 1982. Describes special adaptations for common assessment instruments (standardized tests); includes equipment which is useful for test adaptation.

Testing Physically Handicapped Students in Science: A Sourcebook for Teachers. Harry G. Lang, editor; Dean R. Brown, Kenneth Ricker, E.C. Keller, Jr. Printech, 1125 University Avenue, Morgantown, WV 26505. $4.50. Numerous suggestions are provided to assist in development and administering teacher-developed tests in classes having physically handicapped students. Although specifically written for science teachers, the recommendations are made by the authors to help reduce testing bias are applicable to all areas of the curriculum. Many suggestions are appropriate for standardized testing as well.

Today's Hearing Impaired Child: Into the Mainstream of Education. Vira J. Froehlinger, Editor and Co-Author. Alexander Graham Bell Assn. for the Deaf, 3417 Volta Place NW, Washington, DC 20007. 240 pages. $14.95. 1981.

See also sections on: **SEATING, CONTROL, COMMUNICATION AND SENSORY AIDS, MICROCOMPUTER APPLICATIONS, TOYS & GAMES.**

VOCATIONAL EDUCATION

The resources available in the field of vocational and industrial education are often overlooked both by adult rehab personnel and by special educators. These resources span the transition zone between classroom and employment. It stands to reason that if an equipment modification was needed to train a disabled student in shop, the same adaptation may be needed on the job. Some of the technical aids, adaptations and approaches that are useful at work may also be beneficial in school (and vice versa). Hopefully, exposure to the realm of vocational education will draw us closer to vocational goals; then the transition will be complete.

Publications from the Vocational Studies Center (Publications Unit, University of Wisconsin-Madison, 964 Educational Sciences Building, 1025 W. Johnson Street, Madison, WI 53706, phone 608/263-4357) have found their way into "rehab" by the force of aggressive marketing.

Tools, Equipment & Machinery Adapted for the Vocational Education & Employment of Handicapped People. The original guide to modified tools, containing descriptions and illustrations of 283 products modified for use by handicapped people in vocational education and employment. Cross-referenced by disability and by vocational area. 787 pages. 1981. $33.00.

Tools, Equipment & Machinery: A New Catalog Supplement. Adapted for the Vocational Education & Employment of Handicapped People. The supplement contains descriptions and illustrations of 231 products modified for use in educating and employing handicapped people. There are no duplications from the original Tools (described above), but 671 pages of all new, modified products. A valuable guide for employers, consumers, vocational and special needs educators. 1983. $32.00.

Others, such as Special Needs Education Material for Vocational and Industrial Education (see below) are not as easy to locate. (This book is, however, cited in Tools, Equipment & Machinery.)

Special Needs Education Material for Vocational and Industrial Education: Apparatus Plan Book. Kenneth L. Bruwelheide, Project Director. Department of Agricultural and Industrial Education, Montana State University, and Montana State Office of Public Instruction, Vocational Education, Helena, Montana. 1981. "This planbook is a collection of technical drawings, illustrations, and bills of material of apparatus developed to assist the physically handicapped while working in a vocational area laboratory/shop setting. Most apparatus are designed as retrofit items to be placed on, or added to, existing commercial woodworking and metal working tools and equipment.

"Safety and proper tool usage was a prime consideration while developing these apparatus. Every effort was made to preserve correct operational procedures.

"It is noted that these apparatus will not solve machine/tool operation difficulties for all handicapping conditions. Each handicapped individual has their own set of abilities and disabilities. Hopefully these plans may serve as a guide for the continued development of such apparatus for many handicapped individuals.

"While planning, constructing and testing these apparatus the following factors were kept in mind:

A. Safety of use
B. Simplicity
C. Availability of materials
D. Expense
E. Ease of construction
F. Not to restrict the use of tools and equipment by the non-handicapped

"Each of the items is complete with an orthographic drawing, an isometric illustration, and a bill of materials. It should be noted that dimensions may need to be changed to fit particular pieces of equipment."

Special Needs Education Material for Vocational and Industrial Education is a four-part series: Apparatus Plan Book, Bibliography, Planning Guide for Vocational Area Teachers, and Classroom Teachers Handbook. Part of the bibliography is included here.

"The purpose of this bibliography is to present references pertinent to Special-Needs--Mainstreaming Topics. In particular, this listing reflects the effects of Public Law 94-142 upon the various disciplines of vocational education and related topics by presenting material published since the law's passage in 1975. Selected earlier references were included when determined to be of particular value.

"Resources examined include:

"Applied Science and Technology Index
Business Periodicals Index
Current Index to Journals in Education
Dissertation Abstracts International
Education Index
Monthly Catalog to United States Government Publications
Monthly Checklist of State Publications
Public Affairs Information Service
Resources in Education (including an ERIC database search)
Resources in Vocational Education
Social Sciences Index
State Education Journal Index
Subject Guide to Books in Print

"This bibliography is compiled in an effort to assemble as many sources and references related to mainstreaming as possible; it should not be considered complete or comprehensive. Citations have not been systematically evaluated, and no implications regarding quality of materials should be drawn.

"Since the first edition of this bibliography was compiled in May of 1980, there has been an explosion of printed material on the subject of mainstreaming. Thus, the above resources have again been searched and the findings have been incorporated to form this second edition."

The section on "Adaptive Equipment, Materials and Facilities" has the following references:

Aiello, B. Places and Spaces: Facility Planning for Handicapped Children. Council for Exceptional Children, Reston, VA. ERIC Document Reproduction Service No. ED 123 838. 1976.

Asher, J., & Asher, J. "How to Accommodate Workers in Wheelchairs." Job Safety and Health, 4, October, 1976, pages 30-35.

"Barrier Free Site Design." Yearbook of Special Education, 3, 1977-1978, pages 301-333.

Birch, J.W. & Johnstone, B.K. Designing Schools and Schooling for the Handicapped: A Guide to the Dynamic Interaction of Space, Instructional Materials, Facilities, Educational Objectives and Teaching Methods. C.C. Thomas, Springfield, IL. 1975.

Bland, E., et al. "Availability, Usability and Desirability of Instruction Materials and Media for Minority Handicapped Students." Journal of Special Education, 13, Summer 1979, pages 157-167.

Brown, R.N. Development of curriculum for a non-traditional machine tool technology program accessible to the physically handicapped. Chabot College, South County Community College District, Hayward, CA. 1979.

"Building Without Barriers: Occupational Center of Union County, Roselle, New Jersey." American School and University, July, 1978, pages 22-23.

Cohen, U., et al. Mainstreaming Handicapped Children: Beyond Barrier-Free Design. University of Wisconsin-Milwaukee, School of Architecture and Urban Planning, Milwaukee, Wisconsin. ERIC Document Reproduction Service No. ED 188 374. 1979.

Cooper, N.E. "Vocational Reintegration of Handicapped Workers with Assistive Devices." International Labor Review, 115, 1977, pages 343-352.

Corley, J. "Breaking Down the Barriers." Florida Vocational Journal, 3(5), 1978, pages 20-23.

Ersing, W.F. "Guidelines for Designing Barrier-Free Facilities." Journal of Physical Education and Recreation, 49, October 1978, pages 65-67.

Franks, F.L. & Butterfield, L.H. "Educational Materials Development in Primary Science: Simple Machines." Education of the Visually Handicapped, 9, Summer 1977, pages 51-55.

Goodman, L. "Meeting Children's Needs Through Materials Modification." Teaching Exceptional Children, 10, Spring 1978, pages 92-94.

Graham, S., et al. "Educational Personnel's Perceptions of Mainstreaming and Resource Room Effectiveness." Physiology in the Schools, 17, January 1980, pages 128-134.

Hull, M.E. & Eddy, W. "Teaching Special Needs Students: Instructional Materials." Industrial Education, 66, November 1977, pages 21-22.

Illinois State Board of Education. Accessibility to Laboratories and Equipment for the Physically Handicapped: A Handbook for Vocational Education Personnel. Springfield, Illinois. 1981.

Johnson, A.B. & Fiscus, E.D. "Media and Mainstreaming: Partners in Providing Appropriate Education for the Handicapped." Educational Technology, 20, December 1980, pages 15-17.

Kelley, C.H. The Development of Individualized Supportive Services for Physically and Sensorially Limited Adults at a Post-Secondary Area Vocational School. Final Report. Department of Health, Education & Welfare, Washington, DC. ERIC Document Reproduction Service No. ED 146 345. 1977.

Kliment, S.A. Into the Mainstream: A Syllabus for a Barrier-Free Environment. U.S. Government Printing Office. Washington, DC. 1976.

Lance, W.D. "Technology and Media for Exceptional Learners: Looking Ahead." Exceptional Children, 44, October 1977, pages 92-97.

Leo, R.J. "Access for Handicapped Students and Employees." Journal of the College and University Personnel Association, 28, Spring 1977, pages 1-5.

"Living and Learning Aids: High Technology and Home Remedies; Symposium." Exceptional Parent, 9, February 1979, pages A1-A17.

Litton, F.W. & Kay, R.S. "Annotated Bibliography of Low Cost Vocationally Oriented Materials for Adolescent and Young Adult Mildly Handicapped and Disadvantaged Individuals." Journal for Vocational Special Needs Education, 2(2), 1980, pages 13-17.

Litton, F.W., et al. (Comps.) "Materials for Educating Nonhandicapped Students About Their Handicapped Peers." Teaching Exceptional Children, 13, Fall 1980, pages 39-43.

Mainzer, R., et al. A Resource Manual for Program Developers: Level 1. Maryland State Department of Education, Office of Special Education, Baltimore, Maryland. ERIC Document Reproduction Service No. ED 193 816. 1980.

McCormack, J.E. "The Assessment Tool That Meets Your Needs: The One You Construct." Teaching Exceptional Children, 8, 1976, pages 106-109.

"Modifying Facilities at Minimum Cost to Meet the Needs of the Handicapped." College and University, 54, Summer 1979, pages 292-293.

Nuce, D.E. "Technology and Special Education." Man/Society/Technology, 39, February 1980, pages 18-19.

Petrie, J.A. Media and Mainstreaming: An Annotated Bibliography and Related Resources. ERIC

Clearinghouse on Information Resources, Syracuse, NY. ERIC Document Reproduction Service No. ED 190 130. 1979.

Physically Handicapped -- Adaptive Aids and Equipment/Communication Systems/Architectural Design: A Selected Bibliography. Council for Exceptional Children, Reston, VA. 1981.

Redden, M.R. (Ed.) "Assuring Access for the Handicapped: Symposium." New Directions for Higher Education, No. 25, 1979, pages 1-117.

Rieth, H.J. & Semmel, M.I. "The Use of Microcomputer Technology to Prepare and Enable Teachers to Meet the Educational Needs of Handicapped Children." Teacher Education and Special Education, 9(2), 1979, pages 56-60.

Russo, J.R. "Mainstreaming Handicapped Students: Are Your Facilities Suitable? Physically Disabled Students." American School and University, 47, October 1974, pages 25-33.

Schwartz, S.E. Architectural Considerations for a Barrier-Free Environment. University of Florida, College of Education, Gainesville, FL. ERIC Document Reproduction Service No. ED 153 048. 1977.

Seaman, J. "Adapted Recreation and Equipment." Exceptional Parent, 9, April 1979, pages R12-R13. 9, June 1979, pages 51+.

Speece, D.L. & Mandell, C.J. "Resource Room Support Services for Regular Teachers." Learning Disability Quarterly, 3(1), 1980, pages 49-53.

Steinfeld, E. "Barrier-Free Design Begins to React to Legislation, Research." Architectural Record, 165, March 1979, pages 69+.

Tennessee School Planning Lab. Planning Facilities for Physically Handicapped Children. Fifth Annual Conference Report. University of Tennessee, Knoxville, TN. ERIC Document Reproduction Service No. ED 102 763. 1974.

"Typing for the Handicapped: Methods and Materials." Business Education World, 59(1), 1978, pages 3-5.

Venn, J., et al. "Checklists for Evaluating the Fit and Function of Orthoses, Prostheses and Wheelchairs in the Classroom." Teaching Exceptional Children, 11, Winter 1979, pages 51-56.

Wilhoyte, C.H. "Contracting: A Bridge Between the Classroom and Resource Room." Reading Teacher, 30, 1977, pages 376-378.

Windham Southeast Supervisory Union. Building Needs for the Handicapped. Bureau of Elementary and Secondary Education (DHEW), Washington, DC. ERIC Document Reproduction Service No. ED 140 535. 1975.

Zimmerman, M.D. "Technology for the Handicapped." Machine Design, 50, November 9, 1978, pages 24-26+.

TECHNOLOGY AT THE WORKPLACE

INTRODUCTION

"Appropriate technology for the workplace becomes an issue when a disabled person takes a new job or when a person becomes disabled and returns to an old job. Questions are often raised about appropriate technology and cost-effectiveness when considering job site modifications and the use of adapted equipment."

Dr. Nancy Crewe lists seven criteria for successful job site modifications for handicapped workers. Each criterion asks a question or series of questions which, if answered correctly, can create a successful job site adaptation to help a worker become more productive. The seven criteria and some related questions are:

- **Function**: Will the adaptation meet the need? Will it to what is expected of it?
- **Adaptability**: Will the modification impair the usefulness of equipment for nondisabled co-workers? What are the attitudes of co-workers toward the adaptation?
- **Availability**: Can the equipment be obtained? Can it be manufactured easily?
- **Cost**: How much does it cost? Can the money be found to pay for it? Is it cost-effective?
- **Maintainability**: Can it be maintained easily? Is it simple enough to minimize maintenance problems?
- **Comparability**: Is this adaptation better than the available alternatives?
- **Acceptability**: Will the handicapped worker use the adaptation?

from: Technology for Independent Living II, Project on Science and Handicapped. Available from: American Association for the Advancement of Science, 1776 Massachusetts Avenue NW, Washington, DC 20036.

COSTS

For statistics on costs of reasonable accommodation, and the percentages represented by special equipment, refer to:

A Study of Accommodations Provided to Handicapped Employees by Federal Contractors Commissioned by the Department of Labor.

Excerpts from this study can be found in the FUNDING section of this Sourcebook; page 262.

WORKSTATION DESIGN

Samuel R. McFarland
Southwest Research Institute
San Antonio, Texas

A. INTRODUCTION

In the Third Wave, Alvin Toeffler predicts that, in the future, the "electronic cottage" will enable people to remain at home while on the job. Electronic communication and materials handling systems will nullify the need for co-workers to be housed under the same roof. Indeed, recent trends in production assembly lines and office architecture toward flexibility in spatial arrangement and furnishings tends to support his forecast. Modular offices are being created so that a work area can be easily rearranged to suit the needs of a specific worker and his job description. By quickly interchanging modular components, a work area can be expanded or contracted and changed from a drafting area to a secretarial area to an electronics assembly area to a recreational area. A great deal of research and innovative design has gone into these new concepts.

But, at present, most offices are fixed by rigid walls, heavy file cabinets, and twin pedestal desks. Manufacturing areas have rigid piping, bolted down workbenches, and crowded floorspace. To change is an expense beyond the present budget. The disabled job applicant must deal with the fact that his prospective work area is inflexible and his prospective employer is cost-conscious. Rehabilitation engineering for workstation adaptation must deal with the practical realities of the irresistible force versus the immovable object. The wheelchair user must be squeezed into a confined space, raised to table height, and his available functional capacity must be augmented with adaptive devices. This must be done at minimal cost with only minor alteration of the employer's work area. The resulting adaptation must be delivered quickly, allow for frequent updating, and last "forever."

As if the mechanical requirements were not stringent, the interfacing systems are even less workable. The vocational rehabilitation agency, in an effort to mix the two extremes of client service and taxpayer accountability, will delay the placement process in order to document the procedures. The potential employer understandably, does not want to modify his building, threaten his insurance program, or alter a worksite for a handicapped applicant, if an able-bodied person has also applied. Besides, the employer probably wants someone "now," not six weeks downstream when all the evaluations and adaptations have been completed.

This presentation will attempt to describe realistic, cost-effective, quick response methods for approaching the challenge of workstation adaptation for persons whose neuromuscular, auditory, or visual function differs significantly from the norms which guided the configuration of an existing worksite.

B. FUNDAMENTAL PRINCIPLES

1. Validate in Use

There is no place in our methods for a "disability type." The individual for whom adaptations are planned is unique and must be intimately involved in the process. He alone will determine the success of the adaptation. The prospective employee must ultimately demonstrate, to himself and his potential employer, that he can perform the work required by the job. Only then can the validity of the adaptation be proven.

2. Focus on Function

It is altogether too easy to be distracted by a person's disability. To do so is to dilute the energy directed toward augmenting the ability that is available. By focusing on the work tasks required, we are able to concentrate adaptive resources on the positive, usable functions.

3. Strive for Simplicity

A designer may have a tendency to create elaborate, sophisticated, high-performance adaptive modifications. To do so is to introduce complexity, unreliability, and high-cost. Worse still, there is a significant risk that the adaptation will stymy growth and advancement on the job. Inexpensive, readily purchasable consumer products should be utilized to the ultimate.

4. Generalize

Many worksite adaptations intended for a handicapped person have proven to benefit the non-handicapped co-worker as well. After all, if optimizing work function is the goal, it is likely that anyone's function at the workstation will be enhanced. This can be a strong convincing argument for a potential employer.

C. CONSTRAINTS

As a workstation designer, you must realize that you are a small part of the system which is involved with preparing a suitable work situation for its client. Each part of that system is guided by expectations regarding time, cost, documentation, and definition of success. The key participants in that system are the client, his prospective employer, the service provider (counselor, rehab nurse, placement specialist). You must recognize that the needs of each are not necessarily compatible.

1. Client

The person for whom the worksite is being designed is either a "new hire," has not worked for that employer before; or he is a "re-employ," has worked for the employer before, but not necessarily at the same job. If he is already knowledgeable about the job, he is your most important source of information. If not, reserve his input for the trial-use stage mentioned later. He will be concerned with time and appearance, not costs.

2. Employer

If the client is a "new hire," the employer will be concerned about the compatibility of the client and any intended adaptations with his status quo. Unless he is under pressure to provide accommodations for handicapped workers, he will push for minimal changes to the work area and demand that modifications be performed quickly and at small cost to his budget. It will be important for the client to perform competitively with respect to his non-handicapped co-workers.

If the employer is trying to satisfy a requirement that he accommodate handicapped persons, then time and cost may not be serious constraints. His primary mission will be to show good intent, whether he actually hires or not. If he has a strong resistance to hiring handicapped workers, he may wish to extend the period of adaptation.

On the other hand, if the employer is trying to reinstate an experienced employee who has become disabled during a term of employment, he will probably be more seriously motivated toward getting an appropriate workstation adaptation. He will, in this case, be more likely to commit time and money to the task, especially if the adaptation will enable return to the same job function as before the disablement occurred.

3. The Service-Provider

The intermediary in most vocational rehabilitation cases is the agent who attempts to marry the employer and the disabled client. He may be a government employee, a medical professional, or an insurance person. In most instances, the service tends to be either medically or educationally oriented, and almost always requires a great deal of documentation. Typically, a client file contains reports from a medical doctor, a psychologist, one or more therapists, and a vocational evaluator. In most instances, he will have undergone a physical capacities examination, various skills and preference tests, and work adjustment training. At the time he is presented to the prospective employer (and the workstation designer), he has been declared "work ready."

For most of these reports and tests, the professional who wrote the report has been paid according to a negotiated fixed fee schedule or hourly rate. The client passed through this system at a pace set by the professionals. There is no set fee schedule for workstation design, however, so it is usually necessary for the designer to prepare a cost-estimate and be prepared for competi tive bidding or a delay pending justification of a sole-source contract.

4. Payment System

The workstation designer will not be paid up front; he must wait as much as several months after completion of the job. In decreasing order of promptness; payment will come most quickly if from the employer, then the insuror, then the government agency. If special adaptive equipment is to be specified by the designer, then purchased by the service-provider, expect to be delayed by the procurement system.

These experienced observations are colored with cynicism, admittedly, but are offered as realistic precautions. If the designer is aware of the pitfalls, he should be better prepared to plan and schedule his design and creative services. He must access a capital base which will allow him to survive until the backlog of work and receivables becomes balanced to the point of being financially self-sustaining and evenly paced.

D. DESIGN PROCESS

To ensure that the client is successfully and permanently adapted to his intended work, the designer must consider the worker and workstation as components of a steady work flow process. There are two processes that must interact smoothly, getting to and from the workstation and doing the work itself.

1. Access

A worker is not a permanent attachment to his worksite, he must move to it, away from it, and around it during the course of a work period. If access is a time and energy-consuming struggle, it not only reduces the efficiency of the work period, but it also limits the freedom for occasional stress-relieving breaks. The entire employment environment should be surveyed for accessibility. Not only the main entrance, restrooms and water fountains (as is most common), but also the supervisor's office, the coffee urn, the lunchroom, and the emergency exits.

Access space requirements are three-dimensional. A common mistake in examining accessibility is to focus on the floor plan. Remember that barriers can include poor illumination, lack of tactile and audible labels, and overhanging obstacles for visually handicapped workers; time period bells and safety alarms or sirens for hearing impaired workers; and door thresholds, heavy door closers, and dirty or cluttered floors for mobility impaired workers. Of course, there are many other details to be considered for each client such as intolerance to temperature extremes in the SCI quad. It is essential, however, to take time to thoroughly flush out potential barriers. If possible, include the client in your evaluation at the worksite. If not, make a concerted effort to play his role, complete with cane, wheelchair, or whatever adaptive devices may be used by the prospective employee.

2. Positioning

Locating the worker relative to his work function can be a key element in the efficiency and endurance of his daily performance on the job. In many cases, the disabling condition causes a significant deviation from the norms used in the original design of furniture and machinery used by non-handicapped employees. Because of visual impairment, a worker may need to be positioned so that his eyes are very near his work without accessing an uncomfortable sitting, standing, or bending over position. Necessary occasional supplies may have been stored in overhead cabinets that are beyond the reach of a seated person. A cerebral palsied person may require that the work be located in her lap or to one side. An arthritic client may not be able to tolerate upright seating for prolonged periods.

3. Interface

Assuming that the client has been accessed to and positioned at his workstation, we can now attempt to plug him into the work flow. As stated previously, the workstation design should neither modify the person nor the work to be done. Both should be considered inviolate. The remainder is the space between the worker and the work, the interface. We can attach to the worker and the workpiece and we can design the linkage between.

It is appropriate at this point to bring up and emphasize a common pitfall in adaptive workstation design. When supplied with a limited array of worker functions and a requirement for competitive productivity, there is a tendency to automate, to supplant worker function with machine function. The danger is that "supplant" can easily become "replace" and the outcome of such an evolution is to eliminate the role of the worker. Automation is a usefully ally in workstation design, but, like alcohol, needs to be used in moderation and with a cautious appreciation for the effects of its abuse.

Attachments to the worker are nominally encompassed by the professions of occupational therapy, orthotics, and prosthetics. If a mouthstick, head-pointer, hand splint, torso harness, or leg bracing are required for a workstation system design, the professional should be consulted or retained.

Attachments to the machinery or workpiece are sometimes better understood and produced by the plant engineer or the machine manufacturer. If a keyguard, a switch relocation, or a workbench alteration are needed, these specialists should be contacted. Many times, a rough concept of the required modification is all the workstation designer need to supply. The machine technician can often take it from there.

The linkage between worker and workplace is the most fertile ground for the specialized equipment knowledge and creativity of the adaptive workstation designer. In that arena, the designer can achieve a successful extension and augmentation of available function without changing the worker or the machinery and furniture. Switches, electronic communicators, reaching aids, turntables, adaptive telephones, environmental controls, and specialized tools and material handling equipment are some of the specific linkages which are used.

E. SIMULATION

There is no more revealing evaluation technique than real, on-line trial work by the prospective employee. If the employer will cooperate, the trial should be conducted on-site, at a conventional production worksite. If not, in his training area. If not that, then opt for remote simulation, incorporating as much detail as practical.

Since this is probably the most impactful opportunity for the workstation designer, he should attempt to simulate a completed adaptation, if possible. To do so requires access to a broad array of commercially available adaptive equipment and materials for fashioning crude modifications on site. In our experience, there are a few materials that will enable a broad sweep of adaptations; namely duct tape, cardboard boxes, and balsa wood. They can be formed into many shapes, are reasonably durable, and are readily available at most neighborhood hardware stores.

Simulation is a powerful, non-threatening way to test a workstation design concept. If it works, it strengthens the resolve of all concerned; if it doesn't, it is easy to change. The margin between success and failure in adaptation is measured in fractions of an inch; best gaged by actual trial use, which simulation provides. Until it has proven to be functional, a workstation should remain flexible. Size, color, illumination, height, angle, separation, and location of workstation components must be tailored to the user for optimum performance.

F. TOOLS

This section relates closely to interface design, but is so important it needs to be discussed separately. Tools are machines intended to enhance human performance. Pliers amplify gripping force, a hammer increases impact energy, a template guides a pencil to improve the accuracy of a shape. Force, accuracy, speed, and endurance can be aided by appropriate tool selection.

Tools are often assigned to a specific worker and are considered as expendable and renewable supplies. If a custom adaptation is needed for disabled worker, it should be applied, if possible, to the tool rather than the worksite. In most areas, the vocational rehabilitation agency will purchase tools and simple modifications for its client. Tools are readily available, inexpensive, easy to service or replace, and familiar to non-disabled co-workers. The last feature aids in the attitudinal adaptation of the worksite. The other features introduce a more general, very important principle.

G. PROCUREMENT

1. Supply Resources

In adaptive design there is a tension between two principles:

- Custom workstations optimize performance (but are expensive to produce)
- Conventional workstations are less expensive (but may not aid performance)

Recalling that time delays for adaptation and expensive changes are major barriers to successful job placement, we are forced to lean toward the latter principle. A greater success pattern will derive from consistently quick, inexpensive adaptations; even though that may not promote the optimum performance from the worker.

The adaptive designer should develop a knack for identifying common, commercially available tools, materials, and components to incorporate into supply houses, and industrial or office supply catalogues are fertile resources for ideas and solutions. The immediate shop or office environment may offer significant clues for adaptive products.

2. Equalizers

There are products in daily use in modern industry that are adaptive in nature, largely insensitive to a disabling condition. They are familiar, commercially available, and relatively inexpensive because of a broad market. While examining a potential employer/worksite, look for and point out the adaptability of:

- modular furniture
- movable partitions
- adjustable furniture (drafting tables...)
- electric carts
- intercoms and speaker phones
- microcomputers
- horizontal files
- elevators

H. SUMMARY

As workstation designers, we need to be timely, cost-conscious, and practical. We should emphasize and enhance the "normalcy" of our client.

THREE CASE STUDIES

The Rehabilitation Engineering Center at Wichita, Kansas provides vocational opportunities for severely handicapped people through the medium of engineering. These case studies are a brief outline of the process used in the application of rehabilitation engineering to vocational problems confronting severely handicapped people. They range from the simple to the complex, the relatively inexpensive to the expensive. They are an example of how rehabilitation engineering can be put to work effectively solving problems in living and independent vocational realm.

John Leslie
Cerebral Palsy Research Foundation of Kansas
Wichita, Kansas

I. Case Study One: The development of a head switch to allow a handicapped person to operate a numerically controlled lathe.

A. Definition of the Problem

1. The person was unable to open and close the jaws of the chuck of the lathe since he had only one functional arm.
2. The job necessitated two good arms in order to open and close the jaws of the lathe while, at the same time, handling materials.
3. The simultaneous use of both hands was necessary in order to perform the job as the machine was originally configured.

B. The Problem Solution

1. It was determined that the handicapped employee could open and close the jaws of the chuck of the lathe through a switch that he could control with his head.
2. By interdicting the existing controls on the machine, the head control switch could be utilized by the handicapped employee and still the machine could be operated by the able-bodied employee in the normal manner.
3. The cost of such an adaptation which allowed the handicapped person to be productive on the job was less than a total of $20.00.

C. The Outcome

1. Using this device, the individual performing the task was totally productive on a plateau equal to his able-bodied counterparts.
2. The cost of the adaptation was charged off in a very short period of time due to the high volume rate of production that is characteristic of numerically controlled lathes.

II. Case Study Two: Development of adaptive hardware to allow a quadriplegic spinal cord injured person to pursue a professional career in painting.

A. Definition of the Problem

The handicapped person involved desired to pursue a career in professional painting. He performed painting activities through the use of a mouth stick since he was a high level quadriplegic because of an automobile accident.

1. He needed to be able to adjust a drafting table both up and down and fore and aft.
2. He wanted to be able to select one specific color from a group of colors on individual magic markers.
3. These operations had to take place under the control of a head stylus.

B. The Problem Solution

1. A commercially available drafting table with "up and down" controls was purchased.
2. A modification was made in the table through the design of the bracket and the utilization of electric actuator which allowed the table to be tilted fore and aft.
3. A lazy susan type carousel was designed to accommodate 100 magic markers so that the individual could obtain one magic marker from the selection of 100.

C. The Outcome

1. The individual is productive as an artist using the adaptive device.
2. The cost was approximately $4,000.
3. The adaptation was relatively simple and could be performed by local technical personnel.

III. Case Study Three: The operation of a three-axis crimper by a severely handicapped cerebral palsied individual.

A. Definition of the Problem

It was desired to have a severely handicapped individual crimp a tube at three places, 120 degrees apart.

1. The able-bodied person would utilize a punch press and perform three separate crimping operations requiring that the tube be inserted, crimped, extracted and rotated, crimped, extracted, etc.
2. The individual selected for the job had very little functional capability, either handling material or placing the tubes within the

punch press.

3. The volume of production was such that 1,800 units per day was needed.

B. The Problem Solution

A three axis crimper was designed in conjunction with a feeding mechanism to allow this severely handicapped individual to perform the job.

1. The tube was crimped at three places simultaneously thus eliminating any insertion or extraction process.

2. A feeding mechanism was designed to feed the handicapped employee one tube at a time so that he could place it in the feeding cradle of the machine.

3. A feeding device was designed to insert the tube onto a crimping device and retract it after the crimping operation took place.

4. The handicapped person disposed of the tube after the operation was successfully completed.

C. The Outcome

The handicapped individual was assigned to the job and became productive after a relatively short training period.

1. He easily met or exceeded the 1,800 unit per day criteria.

2. After working on the job for approximately two years, his posturing and general physical well being improved.

3. This individual became a valued employee at Center Industries Corporation and received minimum wage or above and has a total fringe benefit package including hospitalization, life insurance, paid vacations, etc.

The Cerebral Palsy Research Foundation of Kansas publishes the quarterly Tech Brief: Problem Solving with Rehabilitation Engineering. Some of the articles in this series include:

- Pneumatically-Powered Wirebender
- Digital Readout Numerical Counter
- Morse Code Typing Aid
- Reaction and Reach Timing Device
- Cylindrical Parts Selector Feeder
- Spindle Drilling Fixtures
- Floor Sweeping Collector
- Work Station for a Quadriplegic CP Typist
- Intra-Individual Ability Evaluation Using the Available Motions Inventory
- Power Lawn Mower "Dead-Man Switch"
- Water Hydrant Torque Assisting Tool

FARMING

Breaking New Ground, Bill Field, Ed. Dept. of Agricultural Engineering, Purdue University, West Lafayette, Indiana 47907. This quarterly newsletter is published through the handicapped Farmer Project at Purdue University. The newsletter reports on developments and resources in the field and carries accounts of farmers who have successfully overcome their disabilities. Although there is no subscription fee, donations of $10 or more are requested for this client supported newsletter.

"The Disabled Farmer." Paraplegia News, December, 1981. Paralyzed Veterans of America, Washington, DC.

"Nature and Proportion of Physical Impairments Among Indiana's Farm Operators." Roger L. Tormoehlen and Bill Field. Department of Agricultural Engineering, Purdue University, West Lafayette, Indiana 47907. $1.00. A summary of a study to determine the nature and proportion of physical impairments affecting Indiana farm operators. Selected case histories are included.

"Working the Land: Adapting Farming for Disabled People." Disabled USA Volume 4, No. 6, 1981. The President's Committee on Employment of the Handicapped, Washington, DC.

Further information on adapted equipment used by disabled farmers may be found by contacting:

Jiri J. Vasa
Rehabilitation Engineering Section
Biomedical Engineering Unit
Queen's University
Kinston, K7L 3N6
CANADA

William E. Field
Extension Safety Specialist
Department of Agricultural Engineering
Purdue University
West Lafayette, Indiana 47907
314/494-1191

There have been a series of workshops for handicapped farmers (Lansing, Michigan, March 1983; Grand Forks, North Dakota, July 1983). Field says that it is sometimes difficult to get the farmers to come to the workshops "because they don't see themselves as handicapped." But these independent and self-reliant farmers have quickly come to realize the many benefits to be had from swapping ideas and resources. The workshops includes examples of owner-built manlifts and controls for tractors, combines, and other equipment; an overview of agricultural equipment adaptations; and a review of resources available to the farmer/grower or family member.

If you would like to have a workshop in your area, or know of an event that would be of special interest to farmers with physical disabilities, please contact Bill Fields at Purdue University.

TECHNOLOGY FOR EMPLOYMENT: RESOURCES

ORGANIZATIONS

These groups focus on employment for the disabled; they can provide information and/or publications on employment related technology.

Human Resources Center
I.U. Willets Road
Albertson, NY 11507
(516)747-5400

Mainstream, Inc.
1200 15th Street, N.W.
Washington, D.C. 20005
(800) 424-8089, also for TTY
(202) 833-1136

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout
Menomonie, Wisconsin

President's Committee on Employment of Handicapped
1111 20th Street, N.W., 6th Floor
Washington, D.C. 20210
(202) 653-5044

Rehabilitation Engineering Center
Cerebral Palsy Research Foundation of Kansas
P.O. Box 8217
Wichita, KS 67208
(316) 688-1888

RehabTech (formerly IMPART)
Texas Rehabilitation Commission
118 East Riverside Drive
Austin, TX 78704
512/445-8375

University of Wisconsin-Stout
Vocational Rehabilitation Center
Menomonie, WI 54751
715/232-1464

PROFESSIONAL RESOURCES

American Institute of Independent Engineers
25 Technology Park-Atlanta
Nor Cross, Georgia 30092
(404) 449-0460

American Society of Mechanical Engineers
345 E. 47th Street
New York, NY 10017
(212) 644-7722

American Society of Safety Engineers
850 Busse Highway
Park Ridge, IL 60068
(312) 692-4121

International League of Electrical Association
2101 L Street, N.W.
Washington, D.C. 20037
(202) 457-8452

National Tool and Die Makers
75 Airport Road
Hartfort, CT 06114
(203) 522-7279

GROUPS CONCERNED WITH COMPUTER EMPLOYMENT AND PROVISION OF COMPUTER-RELATED SERVICES BY SEVERELY HANDICAPPED INDIVIDUALS

Association of Rehabilitation Programs in Data Processing (ARPDP)
P. O. Box 2404
Gaithersburg, MD 20879

The ARPDP represents 26 programs across the country which train severely handicapped individuals as computer programmers. Graduates of these programs are placed in competitive employment. As of December 1982, 715 out of 893 students were successfully placed. The Association responds to inquiries concerning the specific needs of disabled programmers. Persons desiring detailed information are referred to the training program nearest to them. A quarterly newsletter is available from: VIEWPOINT, Center for Independent Living CTP, 2020 Milvia, Room 470, Berkeley, CA 94704

Business Information Processing Education for the Disabled Corporation (BIPED)
26 Palmer's Hill Road
Stamford, CT 06902
203/324-3935

Non-profit educational project for computer programming and related information processing skills for the disabled.

Iowa Computer-Assisted Rehabilitation Group (ICARG)
Apt. B
Northgate Manor
Waukon, IA 52172

Georgia Computer Programmer Group
2201 Glenwood Avenue, SE
Atlanta, GA 30316

LIFT, Inc.
350 Pfingsten, Suite 103
Northbrook, IL 60062
312/564-9004

Not-for-profit contract programming company which identifies, trains and hires physically handicapped to major corporations.

Pearson Computer Assessment Centre
Pearson Hospital
700 West 57th Avenue
Vancouver, BC V6P 1S1 CANADA

Test Fast Services, Inc.
245 Bedford Road
Pleasantville, NY 10570
914/747-1311

Gerald Warren & Associates
4825 Stanford Avenue NE
Seattle, WA 98105

A RESOURCE FOR DEVELOPING ACCESSIBLE JOBSITES

DESIGNING FOR FUNCTIONAL LIMITATIONS

James Mueller
The Job Development Laboratory, George Washington University, Washington, DC

"**How to Use This Resource**

"The following is an example of how **DESIGNING FOR FUNCTIONAL LIMITATIONS** can be used.

"Paul has applied for the job of information receptionist at a large government office. Paul has cerebral palsy. He is qualified for the job, but he and his employer feel that some modifications to the worksite may help. The job requires access to a large directory of employees which must be accessed quickly for visitors seeking a specific office or telephone number. There is considerable use of the telephone involved, and verbal assistance must occasionally be given to visitors.

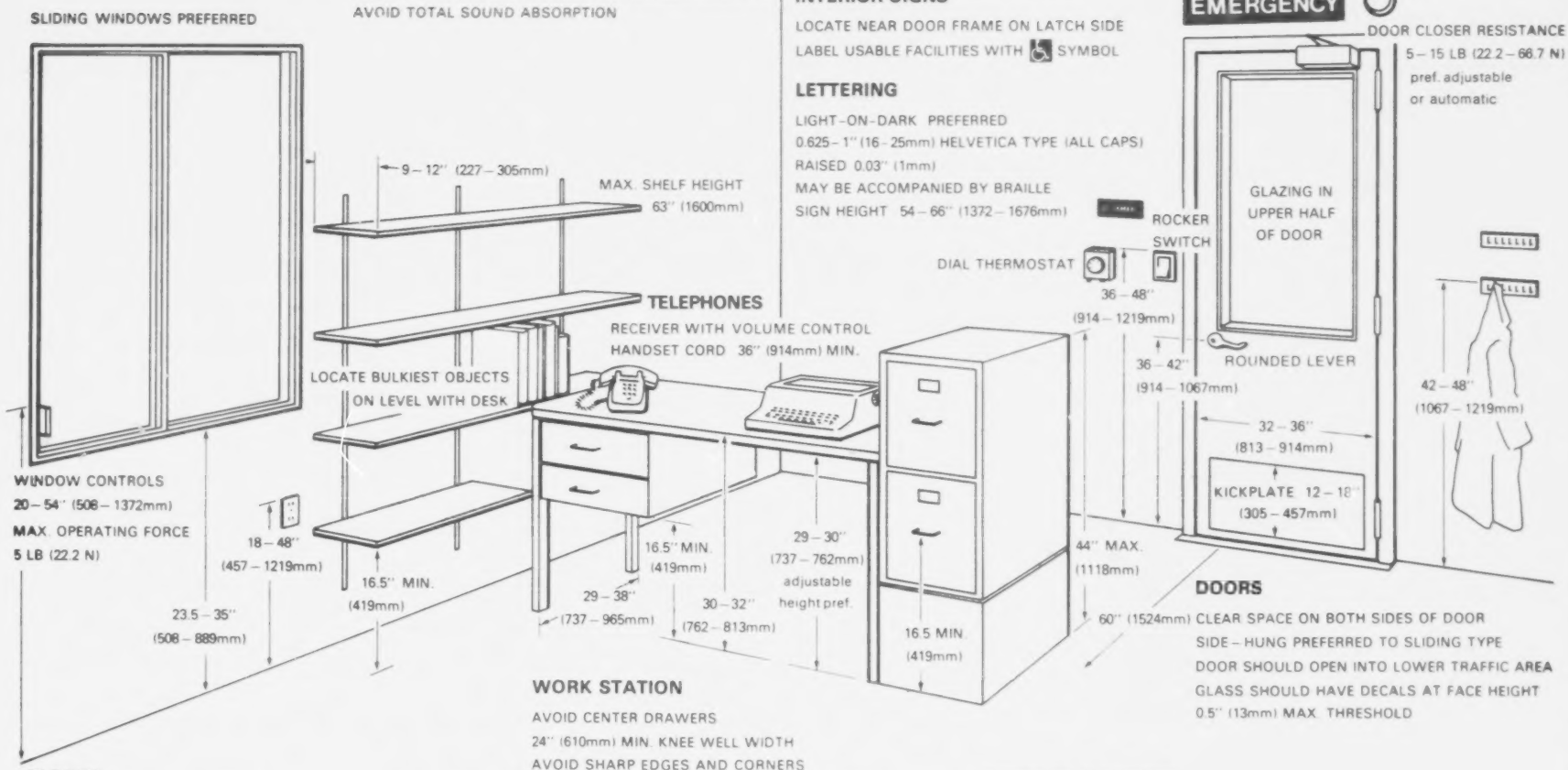
"Paul and his prospective employer have reviewed WORKSITE 1 and 2 illustrations on pages 5 and 7 to check for any major barriers in the general work environment. It is noted that the most serious barriers have already been removed, but door knobs will have to be replaced with levers.

"They then review further modifications as illustrated for functional limitations on pages 13 through 74. On the reverse side of each illustration are listed any disabilities which may require the modifications printed in dark over the WORKSITE illustration. Although Paul has cerebral palsy, he has no difficulty in interpreting information, no limitation of speech, no incoordination, or difficulty in moving his head; therefore, these modifications were not considered. His functional limitations which may affect job performance include poor balance, difficulty in using lower extremities, and difficulty in handling and fingering. The illustrations for these limitations (pp. 41, 39, 33, 73, 71, 65) suggested modifications which could help Paul be more independent at work.

"Handle assists can be placed at the desk to aid him in sitting down and rising from the chair. The stool at the worksite can be replaced with one having full arms and a backrest. Quick access to the office directory is done with a microfilm viewer and a microfilm version of the director. The viewer controls can be converted to push-button operation. A headset receiver will make use of the telephone easier. Paul and his employer agree that these modifications will be useful and cost-effective for this job/client match. In this situation, WORKSITE 1 was used. However, had the job required it, WORKSITE 2 illustrations might also have helped.

"Counselors and evaluators will find **DESIGNING FOR FUNCTIONAL LIMITATIONS** helpful in job planning with their clients. Employers can use it in planning affirmative action programs. Designers and engineers, as well as students of these professions, can use it to plan environments and products more suitable for use by able and disabled consumers alike. **DESIGNING FOR FUNCTIONAL LIMITATIONS** is a workbook, not a textbook. It is offered in looseleaf format to encourage additions, notes, and convenient use. Your comments on its usefulness to you are welcome."

The following six pages are reprinted here with the permission of the Job Development Laboratory, George Washington University, Washington, DC.



WALLS

USE SLIP-RESISTANT, NON-GLARE SURFACES
AVOID ROUGH SURFACES AND PROTRUDING OBJECTS
AVOID TOTAL SOUND ABSORPTION

INTERIOR SIGNS

LOCATE NEAR DOOR FRAME ON LATCH SIDE
LABEL USABLE FACILITIES WITH ♿ SYMBOL

LETTERING

LIGHT-ON-DARK PREFERRED
0.625 – 1" (16 – 25mm) HELVETICA TYPE (ALL CAPS)
RAISED 0.03" (1mm)
MAY BE ACCOMPANIED BY BRAILLE
SIGN HEIGHT 54 – 66" (1372 – 1676mm)

TELEPHONES

RECEIVER WITH VOLUME CONTROL
HANDSET CORD 36" (914mm) MIN.

DOORS

CLEAR SPACE ON BOTH SIDES OF DOOR
SIDE-HUNG PREFERRED TO SLIDING TYPE
DOOR SHOULD OPEN INTO LOWER TRAFFIC AREA
GLASS SHOULD HAVE DECALS AT FACE HEIGHT
0.5" (13mm) MAX. THRESHOLD

WORK STATION

AVOID CENTER DRAWERS
24" (610mm) MIN. KNEE WELL WIDTH
AVOID SHARP EDGES AND CORNERS
NON-GLARE LIGHTING TO MINIMIZE FATIGUE

FLOORS

NON-ABSORBENT MATERIALS IN WARM, DARK COLORS
AVOID COLOR CONTRAST EXCEPT TO DENOTE LEVEL CHANGE
AVOID SCULPTURED TEXTURES OR CHANGES IN DIRECTION OF GRAIN
THIN, HEAVY-DUTY UNPADDED LOOP PILE CARPETING PREFERRED
CARPETING SHOULD BE FIRMLY FIXED TO FLOOR

STORAGE CABINETS

DRAWERS WITH ROLLERS FOR EASY OPERATION
U-SHAPED HANDLES: 4" x 1.5" (102mm x 38mm)
DRAWERS SHOULD BE OPERABLE WITH ONE HAND

SEATING

ADJUSTABLE HEIGHT AND SUPPORT FOR LOWER BACK
(FEET SHOULD REST ON FLOOR OR OTHER SUPPORT)

SPECIFICATIONS ON THIS ILLUSTRATION SUGGEST IMPROVEMENTS TO WORKSITES WHICH WILL AID ABLE-BODIED AS WELL AS PERSONS WITH SENSORY OR LOWER EXTREMITY LIMITATIONS. CONSIDERATIONS FOR MORE SPECIFIC FUNCTIONAL LIMITATIONS ARE DESCRIBED ON TRANSPARENT OVERLAYS.

WORKSITE 1

Reprinted with the permission of the Job Development Laboratory,
George Washington University, Washington DC.

Reprinted with the permission of the Job Development Laboratory,
George Washington University, Washington DC.

Specifications on the reverse side are based on body measurements of the "average adult". Extremes of size and weight may require adjustment of some specifications. Further explanations of these guidelines may be found in the following resources, from which all specifications have been compiled:

CABINETS, DRAWERS, FILES
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a, 3b.
Goldsmith, Designing for the Disabled, 245-251, 315.
Mace, An Illustrated Handbook of the North Carolina Building Code, 117
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 111.

CLOTHES HOOKS
Goldsmith, Designing for the Disabled, 314
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 115
Veterans Administration, Handbook for Design: Specially Adapted Housing, 43

DOORS AND HARDWARE
Cary, How to Create Interiors for the Disabled, 24-31
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26,30
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired: A Handbook, 444
Goldsmith, Designing for the Disabled, 185-190
Harkness, Groom, Building Without Barriers for the Disabled, 31-33
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34, 35, 39, 40;
Mace, Accessibility Modifications, 21-25
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 117, 77-80
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 100-103, 76
Veterans Administration, Handbook for Design: Specially Adapted Housing, 34-37

ELECTRICAL OUTLETS
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3b
Goldsmith, Designing for the Disabled, 212-213
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 110,118
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

EQUIPMENT CONTROLS
Bazar, Ergonomics in Rehabilitation Engineering, 55-71
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 111

FIRE ALARMS/EXTINGUISHERS
Harkness, Groom, Building Without Barriers for the Disabled, 16, 18
Mace, An Illustrated Handbook of the North Carolina State Building Code, 85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112, 125
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 72

FLOORS
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired: A Handbook, 444-445
Goldsmith, Designing for the Disabled, 196-197
Harkness, Groom, Building Without Barriers for the Disabled, 16, 34
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 75

INTERIOR SIGNS
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 28, 29, 3b
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired: A Handbook, 444-447
Harkness, Groom, Building Without Barriers for the Disabled, 16-18
Mace, An Illustrated Handbook of the North Carolina State Building Code, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112-113

SHELVES
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 123-126
Mace, An Illustrated Handbook of the North Carolina State Building Code, 117
National Academic of Science, Accessibility: An Approach to the Development of Design Criteria, C12-C15
Veterans Administration, Handbook for Design: Specially Adapted Housing, 43

TABLES, DESKS, WORK STATIONS
Austin, Resources Handbook for Barrier-Free Design, 79
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a, 3b
Grandjean, Fitting the Task to the Man
Harkness, Groom, Building Without Barriers for the Disabled, 36
Mace, An Illustrated Handbook of the North Carolina State Building Code, 92-93
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 115
Trombly, Scott, Occupational Therapy for Physical Dysfunction, 391-392

TELEPHONES
Cary, How to Create Interiors for the Disabled, 110
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26, 3a
Goldsmith, Designing for the Disabled, 214
Mace, An Illustrated Handbook of the North Carolina State Building Code, 114-115
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 109-125
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

THERMOSTATS
Mace, An Illustrated Handbook of the North Carolina State Building Code, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111

WALLS
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26
Harkness, Groom, Building Without Barriers for the Disabled, 16

WALL SWITCHES
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3b
Goldsmith, Designing for the Disabled, 211
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111
U.S. Department of Housing and Urban Development, Barrier-Free Site Design, 17
Veterans Administration, Handbook for Design: Specially Adapted Housing, 40

WINDOWS AND CONTROLS
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a
Goldsmith, Designing for the Disabled, 178-180
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111, 124
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 106
Veterans Administration, Handbook for Design: Specially Adapted Housing, 38

EASIER DOCUMENT ACCESS
USING BOOKSTAND,
MICROFILM VIEWER,
OR READING MACHINE
(SEE "CONTROLS" AT RIGHT)

TELEPHONE AIDS:
SPEAKERPHONE
HEADSET RECEIVER
ADJUSTABLE ARM FOR RECEIVER
ENLARGED "TOUCHTONE" BUTTONS

CONTROLS:
OPTIMUM OPERATING FORCE: 3/4 LB (3.2 N)
PROVIDE AUDITORY/VISUAL FEEDBACK
AVOID SLICK, UNTEXTURED SURFACES
AVOID NEED FOR TWISTING MOTION
PUSH-BUTTON OR ROCKER PREF. TO LEVER OR KNOB

PEN/PENCIL
THROUGH RUBBER BALL OR
HARD FOAM FOR EASIER GRASP

ELECTRIC SELF-CORRECTING,
AUTO-RETURN TYPEWRITER
WITH KEYGUARD FOR GREATER
HAND SUPPORT AND ACCURACY
AND PAPER ROLL

CASSETTE TAPE RECORDER FOR
MESSAGES, MEMOS, DICTATION, ETC.

AVOID DRAWERS DEEPER THAN 12" (305mm)
OPEN DESK-TOP STORAGE PREFERABLE

BULKY OBJECTS SHOULD BE SLID RATHER THAN LIFTED
USE SLICK SURFACES FOR EASIER MOVEMENT OF MATERIALS
USE BOLTS, CLAMPS, OR NON-SLIP MATS WHERE STABILITY IS NEEDED

DIFFICULTY IN HANDLING AND FINGERING

AFFECTS APPROX. 1% OF U. S. POPULATION)

WORKSITE 1

BEST COPY AVAILABLE

DIFFICULTY IN HANDLING AND FINGERING

Persons with this limitation experience decreased mobility, range of motion, and/or strength in their hands. Approximately 1% of the U.S. population is affected to some degree (National Academy of Sciences, 1976).

This limitation may be experienced by persons having any of the following disabilities:

- Amputations
- Arthritis
- Bilateral Hemiparetic
- Cardiac Disorders
- Cerebral Palsy
- Cerebrovascular Accidents (stroke)
- Congenital Deformities
- Dupuytren's Contracture
- Multiple Sclerosis
- Muscular Dystrophy
- Myasthenia Gravis
- Parkinson's Disease
- Polymyositis
- Severe Burns
- Spinal Cord Injury
- Syringomyelia

Aids suggested on the illustration below have been used by persons having this limitation. No endorsement of specific products is intended. The reader is encouraged to obtain further information from suppliers of:

- BOOKSTANDS
- CASSETTE TAPE RECORDERS
- MICROFILM VIEWERS
- NON-SLIP MATS
- OPEN DESK-TOP FILES AND STORAGE
- READING MACHINES
- TELEPHONE AIDS
- TYPEWRITERS
- TYPEWRITER KEYGUARDS, PAPER ROLLS

Further modifications to WORKSITE 1 for persons having this limitation are suggested on the illustration. Each one should be selected, amended, or rejected according to the expressed needs of the individual and the job.

Reprinted with the permission of the Job Development Laboratory, George Washington University, Washington DC.

AVOID ROUGH SURFACES AND PROTRUDING OBJECTS
AVOID TOTAL SOUND ABSORPTION

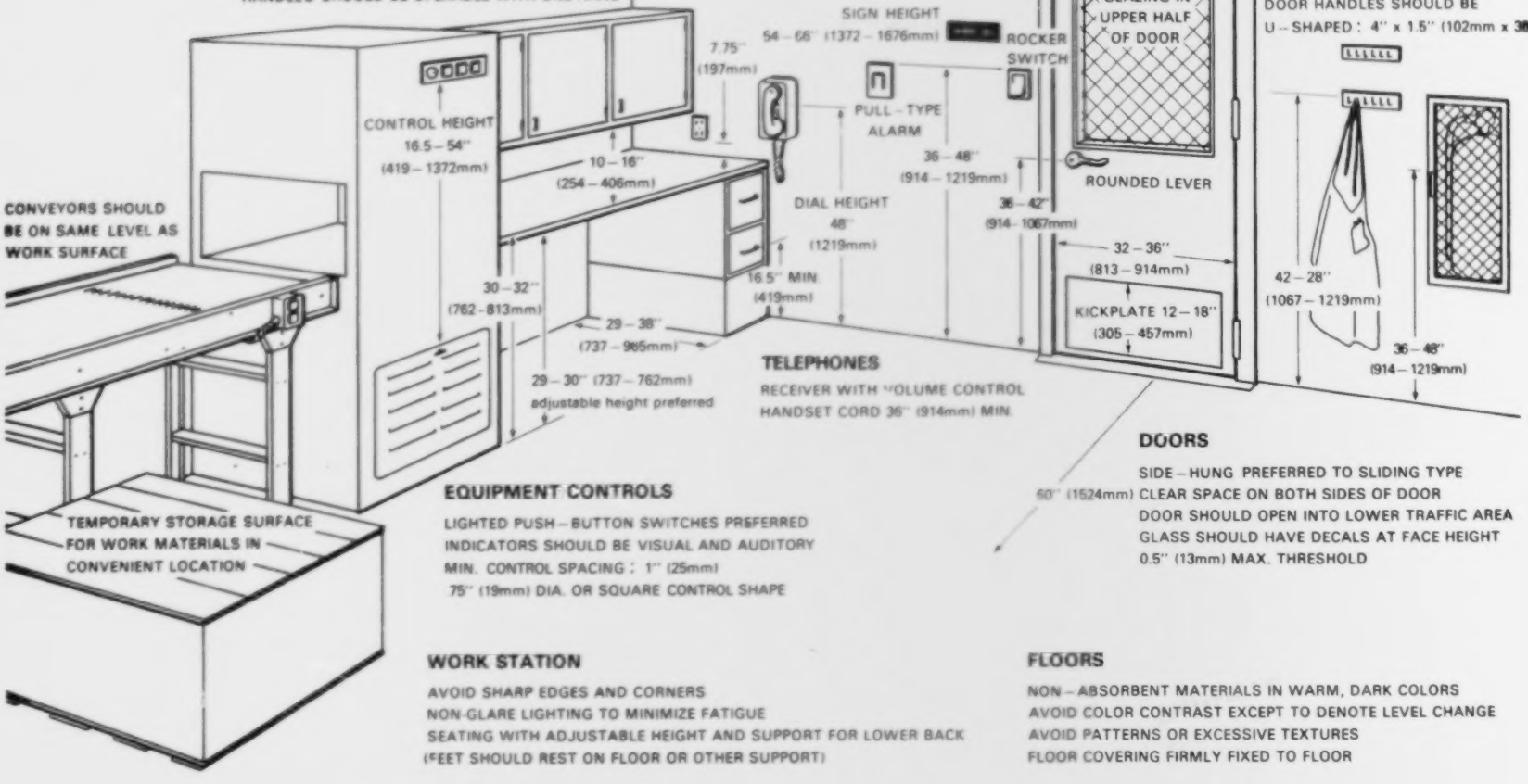
LOCATE NEAR DOOR FRAME ON LATCH SIDE
LABEL USABLE FACILITIES WITH SYMBOL

LETTERING

LIGHT – ON – DARK PREFERRED
0.625 – 1" (16 – 25mm) HELVETICA TYPE (ALL CAPS)
RAISED 0.03" (1mm)
MAY BE ACCOMPANIED BY BRAILLE

STORAGE CABINETS

CABINET HEIGHT 63" MAX. (1600mm)
U – SHAPED HANDLES: 4" x 1.5" (102mm x 38mm)
HANDLES SHOULD BE OPERABLE WITH ONE HAND



DOOR CLOSER RESISTANCE
5-15 LB (22.2 – 66.7N)
pref. adjustable or automatic

IF EXTINGUISHERS MUST BE RECESSED,
DOOR HANDLES SHOULD BE
U – SHAPED: 4" x 1.5" (102mm x 38mm)

TELEPHONES

RECEIVER WITH VOLUME CONTROL
HANDSET CORD 36" (914mm) MIN.

DOORS

60" (1524mm)
SIDE – HUNG PREFERRED TO SLIDING TYPE
CLEAR SPACE ON BOTH SIDES OF DOOR
DOOR SHOULD OPEN INTO LOWER TRAFFIC AREA
GLASS SHOULD HAVE DECALS AT FACE HEIGHT
0.5" (13mm) MAX. THRESHOLD

EQUIPMENT CONTROLS

LIGHTED PUSH – BUTTON SWITCHES PREFERRED
INDICATORS SHOULD BE VISUAL AND AUDITORY
MIN. CONTROL SPACING: 1" (25mm)
.75" (19mm) DIA. OR SQUARE CONTROL SHAPE

WORK STATION

AVOID SHARP EDGES AND CORNERS
NON-GLARE LIGHTING TO MINIMIZE FATIGUE
SEATING WITH ADJUSTABLE HEIGHT AND SUPPORT FOR LOWER BACK
(FEET SHOULD REST ON FLOOR OR OTHER SUPPORT)

FLOORS

NON – ABSORBENT MATERIALS IN WARM, DARK COLORS
AVOID COLOR CONTRAST EXCEPT TO DENOTE LEVEL CHANGE
AVOID PATTERNS OR EXCESSIVE TEXTURES
FLOOR COVERING FIRMLY FIXED TO FLOOR

SPECIFICATIONS ON THIS ILLUSTRATION SUGGEST IMPROVEMENTS TO WORKSITES WHICH WILL AID ABLE – BODIED AS WELL AS PERSONS WITH SENSORY OR LOWER EXTREMITY LIMITATIONS. CONSIDERATIONS FOR MORE SPECIFIC FUNCTIONAL LIMITATIONS ARE DESCRIBED ON TRANSPARENT OVERLAYS.

WORKSITE 2

Reprinted with the permission of the Job Development Laboratory, George Washington University, Washington DC.

BIBLIOGRAPHY

Environmental modification guidelines illustrated in Designing for Functional Limitations have been compiled from resources on architectural accessibility, human factors, occupational therapy, and rehabilitation medicine, as well as from disabled persons' experiences at the worksite.

Aiello, James and Edward Steinfeld. Accessible Buildings for People with Severe Visual Impairments, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

American Mutual Liability Insurance Company. Physical Abilities to Fit the Job, Boston: American Mutual Liability Insurance Company, 1956.

American Society of Landscape Architects Foundation. Barrier-Free Site Design, Washington, D. C.: U.S. Department of Housing and Urban Development, 1976.

Austin, Richard L. Resources Handbook for Barrier-Free Design, Manhattan, Kansas: Theraplan, Inc., 1978.

Bazar, Andy R. Ergonomics in Rehabilitation Engineering, Wichita: Cerebral Palsy Research Foundation of Kansas, 1978.

Chasin, Joseph. Home in a Wheelchair, Washington, D.C.: Paralyzed Veterans of America, 1978.

Chasin, Joseph and Jules Saltman. The Wheelchair in the Kitchen, Washington, D. C.: Paralyzed Veterans of America, 1978.

Decker, Roger W. Mobile Homes: Alternative Housing for the Handicapped, Laurinburg: St. Andrews Presbyterian College (funded by U. S. Department of Housing and Urban Development), 1977.

Diffrient, Niels, Alvin R. Tilley, and Joan C. Bardagjy. Humanscale 1/2/3, Cambridge, Massachusetts: The MIT Press, 1974.

Gerontological Society. Barrier-Free Design for the Elderly and the Disabled, Syracuse, New York: Syracuse University, 1975.

Goldenson, Robert M., Jerome R. Dunham, and Charles S. Dunham (eds.). Disability and Rehabilitation Handbook, New York: McGraw-Hill Book Company, 1978.

Goldsmith, Selwyn. Designing for the Disabled, London: RIBA Publications, Ltd., 1976.

Grandjean, Etienne. Fitting the Task to the Man. London: Taylor and Francis, Ltd., 1969.

Harkness, Sara P. and James W. Groom, Jr. Building without Barriers for the Disabled, New York: Watson-Guptill Publications, 1976.

Lewis, Thord and Sven-Olaf Bratgard. Functional Anthropometry and Hand Grip Strength in Wheelchair Subjects, University of Goteborg, 1969.

Mace, Ronald I. Accessibility Modification, Raleigh, North Carolina: North Carolina Department of Insurance, 1976.

Michigan Center for a Barrier Free Environment. Barrier Free Design Equipment and Aids Catalog, West Bloomfield, Michigan: Michigan Center for a Barrier Free Environment, 1979.

National Research Council. Accessibility: An Approach to the Development of Design Solutions, Washington, D. C.: National Academy of Sciences, 1976.

National Spinal Cord Injury Foundation. National Resource Directory, Newton Upper Falls, Massachusetts: National Spinal Cord Injury Foundation, 1979.

The Ohio Governor's Committee on Employment of th Handicapped. Access for All: An Illustrated Handbook of Barrier-Free Design for Ohio, Columbus, Ohio: The Ohio Governor's Committee on Employment of the Handicapped, 1977.

Peterson, Carol Ann and Peg Connolly. Characteristics of Special Populations: Implications for Recreation Participation and Planning, Washington, D. C.: Hawkins Associates, 1978.

Sorenson, Robert James. Design for Accessibility, New York: McGraw-Hill Book Company, 1979.

Steinfeld, Edward, Steven Schroeder, and Marilyn Bishop. Accessible Buildings for People with Walking and Reaching Limitations, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Steinfeld, Edward, Steven Schroeder, and Marilyn Bishop. Adaptable Dwellings, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Steinfeld, Edward, Steven Schroeder, James Duncan, Rolf Faste, Deborah Chollet, Marilyn Bishop, Peter Wirth, and Paul Cardell. Access to the Built Environment: A Review of Literature, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Suazo, Antonio C. Job Redesign, Washington, D.C.: Goodwill Industries of America, 1974.

Texas Tech University. Human Rehabilitation Techniques, Vol. II, Springfield, Virginia: National Technical Information System, 1977.

Trombly, Catherine Anne and Anna Deane Scott. Occupational Therapy for Physical Dysfunction, Baltimore, Maryland: The Williams and Wilkins Company, 1977.

Veterans Administration. Handbook for Design: Specially Adapted Housing, Washington, D. C.: Veterans Administration, 1978.

Reprinted with the permission of the Job Development Laborat George Washington University, Washington DC.

SELECTED PUBLICATIONS - TECHNOLOGY FOR EMPLOYMENT

An Annotated Bibliography of Literature Related To The Employment of Deaf Persons. National Center on Employment of the Deaf, Rochester, NY. Available from: National Technical Institute for the Deaf, Rochester Institute of Technology, Rochester, NY 14623. 1981. $1.00.

The Assertive Job Seeker. Lilly Bruck. A 3-cassette series: "Technology in the Workplace," "Employer Attitudes," "The Civil Rights of Disabled Employees." Available from: In Touch Networks, Inc., 322 W. 48th Street, New York, NY 10036. 1981. $9.00.

Assisting the Physically Handicapped: An Identification and Development of Apparatus for Laboratory Shop Phase I. K. L. Bruwelheide. Montana State University, Department of Agricultural and Industrial Education, Bozeman, Montana. 1979.

A Comparison of Commercial Vocational Evaluation Systems (Second Edition). Karl F. Botterbusch. Materials Development Center, Stout Vocational Rehabilitation Institute, School of Education and Human Services, University of Wisconsin-Stout, Menomonie, WI 54751. 1981. 133 pages. $10.50. Provides professionals in many human service fields with accurate and detailed information on wide available commercial vocational evaluation systems.

Designing for Functional Limitations. J. Mueller. The George Washington University, Rehabilitation Research and Training Center, Job Development Laboratory, 2300 Eye Street, Washington, D.C. 20037. 1979. Excerpts from this document appear at the beginning of this section.

Employability Restorations Engineering Program for Severely Handicapped. J.W. McLauring, Ph.D. and C. J. Laenger, Sr. Southwest Research Institute, P.O. Box Drawer 28510, 6220 Culebra Road, San Antonio, TX 78284. 74 pages. 1977. The report describes how adaptations, many quite simple and inexpensive, have allowed participants in the program to hold jobs.

Employing the Disabled: What Are Self-Help Groups and What Assistance Can They Offer the Employer? Rami Rabby, 136 E. 55th Street, Suite 8E, New York, NY 10022, (212) 371-7766. $5.00 plus $.50 postage and handling. 1981.

Employment of the Handicapped: Resource Guide. U.S. Department of Education, Office of Special Education and Rehabilitative Services, Publication No. 82-22010, October, 1982. Information on programs to assist disabled persons in obtaining employment, programs creating job opportunities for disabled persons, programs regulating policies concerning employment of disabled persons, information for employers, and information resources and technical assistance.

Employment of the Handicapped--The Goal of Integration and Safety in the Workplace. Proceedings of the Rehabilitation International Vocational Seminar, Toronto, Canada. Available from: Secretariat, Vocational Commission, 1323 Forbes Avenue, Pittsburgh, PA 15219. 1980. $9.00.

A Guide to Job Site Evaluation. K.F. Botterbusch. Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, Wisconsin. How to use different types of job site evaluations, how to set up a job site and evaluate the client. Sample evaluation forms included.

Home Operated Business Opportunities for the Disabled. Accent Special Publications, Cheever Publishing Inc., P.O. Box 700, Bloomington, IL 61701. 109 pp. 1977.

Human Scale 1/2/3, 4/5/6, 7/8/9. The MIT Press, Institute of Technology, Cambridge, MA 12142. Anthropometric charts for men, women, and children. Guideline requirements for physically disabled and elderly people.

The Industrial Engineering Handbook for Sheltered Workshops. David A. Hietala and Paul M. McCray. RPM Press, P.O. Box 627, Menomonie, WI 54751. 309 pages, figures, tabs. Inquire for price. 1982. A reference for streamlining productivity in work centers to result in maximum realistic performance.

The International Directory of Job-Oriented Assistive Devices. Lifeboat, Fox Hill Garden Offices, 5855 Green Valley Circle, Culvery City, California 90230. $29.95. A 200-page guide on assistive devices for over 25 disability groups. The directory includes descriptions of individual disabilities, problems encountered, solutions, how the devices work, and the manufacturer to contact.

Job Redesign. Antonio Suazo. Goodwill Industries of America, Washington, D.C. 1974.

Job Related Physical Capacities Project. Final Report. Florida International University, Miami, Florida. Refers to an aids and accommodations catalogue compiled as part of the project.

Managing and Employing the Handicapped: The Untapped Potential. G.C. Pati, J.I. Adkins, and G. Morrison. Brace-Park Press, P.O. Box 526, Lake Forest, IL. 1981. $19.95 hardcover, $14.95 softcover.

Materials Development Center 1983. Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, WI 54751. 1983. 17 pages. A catalogue of print and audiovisual material about vocational evaluation and related services, rehabilitation facility operations, and independent living.

Modifying the Work Environment for the Physically Disabled. An Accessibility Checklist for Employers. Margaret Desmond. Human Resources Center, Albertson, New York 11507. 107 pp. 1982.

Reading, Writing, and Other Communication Aids for Visually and Physically Handicapped Persons. Reference Circular No. 82-1, National Library Service for the Blind and Physically Handicapped.

The Library of Congress, Washington, DC 20542. October 1981.

Reasonable Accommodation Handbook. Frank Bowe. American Telephone & Telegraph Company. Available from: National Center for a Barrier Free Environment, Information Service, 1015 Fifteenth Street NW, Washington, DC 20005. 202/466-6896. 323 pages. $37.50. 1983. Although produced for AT&T, this document would also be useful to other employers and vocational counselors. It contains an introductory section discussing the concept of reasonable accommodation and reviewing the legal and regulatory requirements. The book provides one-page descriptions, with photographs, of hundreds of products and devices which may prove suitable for use as reasonable accommodations for certain individuals having job-related limitations.

Rehabilitation Engineering: A Counselor's Guide. Report on the Sixth Institute on Rehabilitation Issues, San Antonio, Texas, June 5-8, 1979. Research & Training Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, Wisconsin. 141 pp. 1979

Rehabilitation Engineering Source Books. Institute for Information Studies, Falls Church, VA. 1979.

Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide. Compiled by Sensory Aids Foundation. Available from: American Foundation for the Blind, 15 West 16th Street, New York, NY. 210 pp. 1978. Lists devices and equipment which provide on-the-job assistance to visually impaired people. Each entry describes the function of the device, employment application, vendor, availability, and, in some cases, price. Listings include hard copy and paperless braille devices, braille readout, tone output or voice output calculators, computer terminals or accessories, labeling aids, measuring aids, communication devices, etc. Indexed by employment area.

Speaking of Employment: A Symposium on Disabled People in the Workplace. Mainstream, Inc., 1200 15th Street NW, Washington, D.C. 20005. 1981. $9.00.

Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People. 787 pages. $30.00. 1981. Tools, Equipment & Machinery: A New Catalog Supplement. 671 pages. $32.00. 1983. Wisconsin Vocational Studies Center, 256 Education Sciences Building, University of Wisconsin-Madison, Madison, WI 53706.

Vocational and Educational Aids. Smith Kettlewell Rehabilitation Engineering Center, Smith Kettlewell Institute, San Francisco, CA. 31 pp. 1982. A catalog of sensory aids for blind persons, with an emphasis on low-cost electronic vocational aids. Includes information on acquiring devices or plans and circuit diagrams for devices which are not commercially available. Pictures and a discussion of applications are given. Devices include items to enable blind persons to read meters, scales and other measuring tools. Also available in braille.

Work Independence and the Severely Disabled: A Bibliography. G. Bilotto, and V. Washam. Research and Utilization Institute, National Center on Employment of the Handicapped, Human Resources Center, I.U. Willetts Road, Albertson, NY 11507. 1980. $7.95. A review of literature covering areas related to independence at work: architectural barriers, mobility, transportation, job modification, specialized equipment, and general and vocational rehabilitation.

Working with Cerebral Palsy. E.M. Shaver and K. Mallik. George Washington University, Rehabilitation Research and Training Center, 2300 Eye Street, Washington, D.C. 20037. 1981. $6.00. Vocational training of people with cerebral palsy. Includes a list of alternative techniques and devices to help overcome barriers at the workplace.

Two European books on Technology Assisted Employment have been translated into English recently:

Project Employment and Technology: Final Report. Lucas Foundation for Rehabilitation, Hoensbroek Center for Rehabilitation Technology, Zandbergsweg iii-6432 cc Hoensbroek, Holland. 93 pages. 1982. Between July 1979 and February 1982, the Foundation studied and developed technical provisions for their occupational training and occupational practice of individuals with physical disabilities. A new team -- mechanical engineers, documentation specialist, and administrative assistant -- was recruited and trained to work with other Foundation members in gathering knowledge and providing experience about the applicability of technical aids to employment opportunities. The project designed, produced, and tested technical aids in the work environment in cooperation with industry. The project's successful production of usable items and procurement of jobs is discussed in the conclusion section accompanied by recommendations.

Adapting Work Sites for People With Disabilities: Ideas from Sweden. Gerd Elmfeldt, Caroline Wise, Hans Bergsten, Ake Olsson. The Swedish Institute for the Handicapped, Box 303, S-161 26 Bromma, Sweden. Available in the USA from NARIC or from: World Rehabilitation Fund, 400 East 34th Street, New York, NY 10016. Free. The sources for suppliers are all Swedish, but many of the devices are available in the U.S. Many of the adaptations, and the philosophy behind them, are readily applicable to the U.S.

PERIODICALS

* specific focus on applications for disability

*Aids and Appliances Review. The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158, 617/969-6200. Each issue of this quarterly newsletter evaluates in depth one type of aid for people with visual impairments. Some are applicable to employment. Given the usual paucity of equipment evaluation data available, this publication is a real goldmine of timely and useful inform tion.

American Industrial Hygiene Association Journal. American Industrial Hygiene Association, 475 Wolf Ledges Pkwy, Akron, OH 44311. Subscription: $30.00/yr or Free to Controlled Circulation.

American Printer and Lithographer. MaClean - Hunter Publishing Corp., 300 W. Adams Street, Chicago, IL 60606.

Biomedical Technology and Human Factors Engineering. U.S. Dept. of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Subscription: $55.00/yr.

Biomedical Electronics. Girard Associates, Inc., Box 455, Mt. Arlington, NJ 07856. Subscription: $72.00/yr.

*Bulletins on Science and Technology for the Handicapped. American Association for the Advancement of Science, Office of Opportunities in Science, 1776 Massachusetts Ave. NW, Washington, DC 20036.

Computers and Education. Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523. Subscription: $95.00/yr.

Computers and People. Berkeley Enterprises, Inc., 815 Washington Street, Newtonville, MA 02160. Subscription: $14.50/yr.

Computerworld. Computerworld, Inc., 797 Washington Street, Newton, MA 02160.

Construction Equipment. Cahners Publishing Co., Inc., 270 St. Paul Street, Denver, CO 80206.

Design News. Cahners Publishing Co., Inc., 221 Columbus Avenue, Boston, MA 02116. Subscription: $30.00/yr.

Engineer's Digest. Walker - Davis Publications, Inc., 2500 Office Center, Willow Grove, PA 19090. Subscription: Free to Controlled Circulation.

*Homecare/Rehab Product News. Miramar Publishing Company, 2048 Cotner Avenue, Los Angeles, CA 90025. Subscription: $40.00/yr or Free to Controlled Circulation.

Housing. McGraw-Hill Publications Co., 1221 Avenue of Americas, New York, NY 10020. Subscription: $16.00/yr.

Industrial Equipment News. Thomas Publishing Company, 1 Penn Plaza, 250 W. 34th Street, New York, NY 10001. Subscription: $12.00/yr or Free to Controlled Circulation.

Industrial Maintenance and Plant Operation. Ames Publishing Company, 1 West Olney Avenue, Philadelphia, PA 19120. Subscription: $35.00/yr or Free to Controlled Circulation.

*In the Mainstream, Mainstream, Inc. 1200 15th Street, N.W., Washington, D.C. 20005. Subscription: Bimonthly newsletter $40.00/yr

Machine Design. Penton/IPC, Penton Plaza, Cleveland, OH 44114. Subscription: $50.00/yr or Free to Controlled Circulation.

Manufacturing Engineering. Society of Manufacturing Engineers, One SME Drive, P.O. Box 930, Dearborn, MI 48128. Subscription: $18.00/yr.

Materials Handling Engineering. Penton/IPC, Penton Plaza, 1111 Chester Avenue, Cleveland, OH 44114. Subscription: $24.00/yr.

Materials News. Dow Corning Corp., P.O. Box 1767, Midland, MI 48640. Subscription: No Charge to Controlled Circulation.

Measurement and Control News. Measurements and Data Corporation, 2994 West Liberty Ave., Pittsburgh, PA 15216. Subscription: No Charge to Controlled Circulation.

Medical Electronics and Equipment News. Reilly Publishing Company, 532 Busse Highway, Park Ridge, IL 60068. Subscription: $20.00/yr or No Charge to Controlled Circulation.

Metal Progress. American Society for Metals, Metals Park, OH 44073. Subscription $20.00/yr.

Modern Application News. A. Verner Nelson Associates, 1282 Old Skokie Road, Highland Park, IL 60035. Subscription: $15.00/yr or No Charge to Controlled Circulation.

Package Engineering. Cahners Publishing Co., 270 St. Paul Street, Denver, CO 80206. Subscription: $25.00/yr.

Personal Computing. Hayden Publishing Company, Inc., 50 Essex Street, Rochelle Park, NJ 07662. Subscription: $18.00/yr.

Plant Engineering. Technical Publishing Co., 1301 S. Grove Ave., Barrington, IL 60010. Subscription: $30.00/yr.

Plastics Technology. Bill Communications, Inc., 633 3rd Avenue, New York, NY 10017. Subscription: $15.00/yr.

Popular Science. Times Mirror Magazines, Inc., 380 Madison Avenue, New York, NY 10017. Subscription: $15.00/yr.

Power. McGraw Hill, Inc., 1221 Avenue of Americas, New York, NY 10020 Subscription: $11.00/yr.

*Report. National Center for a Barrier Free Environment, Suite 1006, 1140 Connecticut Avenue, NW, Washington, D.C. 20036.

*Rx Home Care. Barrington Publications, Inc., 825 S. Barrington Avenue, Los Angeles, CA 90049. Subscription: $40.00/yr or Free to Controlled Circulation.

*Sensory Aids Technology Update. Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306. Editor: Sharon Connor. Subscription: $30/year. Available in either print or on cassette. Information about new products, special employment, education and training programs, unusual applications of technology, and what's happening in research and development. Computer hardware, software and interface problems are discussed; product comparisons are profiled. Articles have included: Comparison of paperless braille devices: The MB-2400 and the Versabraille; Users review IBM's new talking terminal for mainframe computers; Compuserve: new data base for handicapped users; Telebraille: prototype TDD for deaf-blind; A look at large FM systems for hearing impaired people; Financing adaptive equipment; Vocational guidance tools; Customizing software programs for speech output.

*Technical Aid to the Disabled Journal. c/o Royal Ryde Rehabilitation Hospital, 227 Morrison Road, P.O. Box 108, Ryde, N.S.W. 2112, Australia. Subscription: $10.

*TechBrief. Rehabilitation Engineering Center, Cerebral Palsy Research Foundation of Kansas, Wichita, Kansas. Quarterly publication.

Today's Office. Hearst Business Communications, Inc., 645 Stewart Avenue, Garden City, NY 11530. Subscription: $30.00/yr or Free to Controlled Circulation.

Welding Design and Fabrication. Penton/IPC, 614 Superior Avenue W., Cleveland, OH 44113. Subscription: $24.00/yr.

PRODUCT/EQUIPMENT DIRECTORIES

Contact ABLEDATA for specific product information.

Best's Safety Directory
A.M. Best Company, Inc.
Ambest Road
Oldwick, NJ 08858

Electronic Engineers Master Catalog
United Technical Publications, Inc.
645 Stewart Avenue
Garden City, NY 11530

*Product Inventory of Hardware, Equipment, and Appliances for Barrier-Free Design
Second Edition, 1981
National Handicap Housing Institute, Inc.
12 So. 6th Street, Suite 1216
Minneapolis, MN 55402

ThomCat
Thomas Register
1 Penn Plaza
New York, NY 10117

*Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People
Wisconsin Vocational Studies Center
University of Wisconsin-Madison
Madison, WI 53706
787 pages, 283 products
$33.00
1981

*A New Catalog Supplement: Tools, Equipment, & Machinery
Wisconsin Vocational Studies Center
University of Wisconsin-Madison
Madison, WI 53706
671 pages, 231 products
$32.00
1983
The supplement contains descriptions and illustrations of 231 products modified for use in educating and employing handicapped people. There are no duplications from the original Tools catalog.

Yellow Pages of Industrial Equipment and Supplies
Industrial Research/Development
1301 S. Grove Avenue
Barrington, Illinois 60010

121

Recreational and Leisure Technology

RECREATIONAL & LEISURE TECHNOLOGY 105

INTRODUCTION: TECHNOLOGY FOR RECREATION 105

SPORTS 109

DISABILITY-RELATED NATIONAL SPORTS ORGANIZATIONS 109
NATIONAL ORGANIZATIONS WITH INTEREST IN RECREATION FOR DISABLED PEOPLE 109

WHEELCHAIR SPORTS 111

SPORTS WHEELCHAIRS 111
BASKETBALL 112
FOOTBALL 112
MARATHON RACING 112
MOTORCYCLING 112
SOFTBALL 112
TENNIS 112

WATER SPORTS 113

BOATING 113
SCUBA 114
WATERSKIING 114

WINTER SPORTS 115

SKIING 115
SKATING 116

OTHER SPORTS 117

BOWLING 117
GOLF 117
FLYING 117
HUNTING & FISHING 117

ADDITIONAL PUBLICATIONS 118

AUDIOVISUALS 118

SOME LOCAL RECREATION PROGRAMS 119

LEISURE ACTIVITIES 122

GARDENING 122
MUSIC 122
NEEDLEWORK 123
FITNESS 124
TRAILS 124

TOYS AND GAMES 125

THE VALUE OF TOYS 125
CRITERIA FOR GOOD EQUIPMENT 125
CHOOSING THE RIGHT TOY 125
CONCEPT OF CONTROL 126
A NOTE ON SAFETY 126
DO IT YOURSELF 126
PEOPLE AND ORGANIZATIONS WITH A SPECIAL INTEREST IN TOYS AND GAMES 126
SOME MANUFACTURERS OF SPECIAL TOYS 127
TOY LIBRARIES 128
SELECTED PUBLICATIONS TOYS & GAMES 130

PLAYGROUNDS 132

RECREATIONAL AND LEISURE TECHNOLOGY

INTRODUCTION

This panel discussion on the role of recreation and leisure in the lives of disabled people explores ways in which technology can assist disabled and able-bodied people in removing barriers to participation. The discussion was presented at the La Jolla Workshop on Science and Technology for the Handicapped: Issues in Technology for Daily Living, on May 11-12, 1981. The workshop was sponsored by the American Association for the Advancement of Science (AAAS).

The panel members are involved in work related to recreation and technology.

Chester Land, Director, Therapeutic Recreation Program, Rancho Los Amigos Hospital, Downey, California.

Peter Axelson, Veterans Administration Medical Center, Research and Development Center, Palo Alto, California.

Marti Hacker, Supervisor of Recreation, Community Service Center for the Disabled, San Diego, California.

Roy Gash, Wheelchair Repair Department Manager, Community Service Center for the Disabled, San Diego, California.

Marri Taylor, Community Service Center for the Disabled, San Diego, California.

QUESTION: "What are some of the psychological benefits derived from participating in wheelchair sports and recreation?

ROY GASH: "I feel more confident about my physical abilities. Racing has improved my eye/hand coordination. After finishing a race I feel great.

MARRI TAYLOR: "I think it's great for people to compete, physically. It's a rewarding experience whether it's playing cards or playing football. Competition is important to everyone, and sports competition is especially important.

MARTI HACKER: "Recreation counteracts the isolating effects of being disabled; it provides a way to meet others and a chance to participate in activities with able-bodied friends. Recreation can eliminate the depression that commonly comes with boredom. Health and a good body image are essential ingredients of self-image. Above all, though, recreation can provide fun, something that disabled people often fear will forever be missing in their lives.

CHESTER LAND: "Everyone owns the right to play, to enjoy playful moments and not feel guilty.

QUESTION: "How can technology benefit recreation for disabled people?

MARTI HACKER: "One of the most important differences between recreation for able-bodied people and for disabled people is the need for additional manpower to help with setting things up for disabled people's use. Technology can be very useful here, since proper design and mechanical assists can eliminate the need for much extra manpower. From a disabled person's point of view, this is usually a plus, since most of us do not like having to depend on another person any more than necessary. Mechanical adaptations increase feelings of, and indeed our level of, independence.

QUESTION: "How did wheelchair sports and the development of special equipment for these sports develop?

ROY GASH: "Wheelchair sports have promoted the development of better, lighter and more durable wheelchairs. All of the changes in wheelchair design have come about because of disabled people using available equipment and not being satisfied with it. The men and women who participate in sports and other recreational activities have developed modified wheelchairs to make them lighter, to fit the sport, and to personalize the chair to make it fit the individual.

"The use of wheelchairs in basketball, track, tennis and off-road activities has promoted the growth of a new generation of wheelchairs for the active wheelchair user. Wheelchair design has remained basically the same since the 1930s when Everest and Jennings started selling their chair. Until the early to middle seventies, all wheelchairs were copies of this basic design. In the past five years, however, many improvements in wheelchair design have been introduced. These innovations can be traced directly to wheelchair sports, the changes have been made by disabled people thinking about the equipment they use.

"All of the chairs which were designed for sports are useful for people with arm and hand weakness. The newer, lighter wheelchairs on the market today can make the difference between a person being dependent and independent -- someone with impaired arm strength can push his or her own lightweight chair, whereas it would have been impossible with the older models. This increased independence is directly related to the many hours spent developing a better wheelchair.

"Quality wheelchair hubs for everyday use are another result of sports. There are several different hubs being manufactured today. These are a great improvement over the standard wheelchair hub. Many wheelchair users find they greatly improve the way a chair rolls. They, too, are especially helpful for people with weak hands or arms.

"Most of the newer equipment on the market today which enables disabled individuals to compete in track, basketball, snow skiing and many other activities is the direct result of a disabled person or group of disabled individuals designing quality equipment for their specific needs.

QUESTION: "What are some of the technological adaptations made to wheelchairs for recreation or competitive use?

ROY GASH: "The wheelchairs used in basketball were the first to be modified to make the chair more manageable. This was done by adding axle plates to enable the user to change the center of gravity. Negative camber was created by using a camber bracket to spread the frame wider at the bottom than at the top. Excess metal was also cut from the frame. These changes were standard if a person wanted to be competitive while playing the game.

"Today the majority of people playing wheelchair basketball use lightweight alloy wheelchairs. These range from Quadra, Quickie or Stainless basketball chairs to locally-made lightweight non-foldable wheelchairs. All of these newer chairs have adjustable rear axle positions, quick release rear wheels, adjustable front casters and adjustable back heights. They also come in any width desired by the user. These new chairs have improved bearings all around, as well as stronger, improved hubs and front casters. They are also stronger than the old models.

"The wheelchairs used in track were originally the same basic wheelchair design. The same modifications made to the basketball chair were made to the track chair, except the track chair had more weight cut from it. Some people used sagged or sagging upholstery to lower their center of gravity. Smaller push rims were used to increase speed.

"Today race chairs are specifically made for racing. Race equipment is designed for the individual and his or her disability, using the design of the chair to increase speed and muscle groups to their utmost capacity.

"My racing chair is long and low. I use 700 centimeter wheels and high-pressure clincher tires. I also use Phil Wood hubs. I use inch-and-a-quarter pneumatics on the front so that I sit about 13 inches off the ground. I have steering handles on the chair because on downhills and curves steering is difficult. These are some of the adaptations that can be made.

QUESTION: "What are the benefits of cambered wheels and Phil Wood hubs?

ROY GASH: "Cambered wheels help for stability and turns. You can turn quicker and not have the likelihood of tipping over. There are chairs now with variable cambers. You can adjust the cambers with a setting, but they're low production chairs. In addition, there are wheels that pop off, just push the button and the wheel comes right off. That helps as far as putting the chairs in cars or other places.

"I think it would be hard to improve the Phil Wood hubs. If I took my wheel and spun it, it would spin twice as long as any other wheel in here without a Phil Wood hub. I think they're probably roller bearings, but I don't know for sure what it is. They're waterproof and dirt proof and guaranteed for a lifetime. Even on a very slight incline you just roll right down it, you don't push. Also you don't have one wheel rolling better than the other; they both roll a true straight line.

QUESTION: "Where can you get Phil Wood hubs?

ROY GASH: "Go to a bike shop. If they carry Phil Wood hubs, they'll string your wheels for $10 or $15.

QUESTION: "We see many changes in the manual chairs, but what about the power chairs?

MARRI TAYLOR: "I would like to see more technology put into the design of power chairs. I would like to see a chair that can be used in sand, mud, dirt, and any kind of situation. I would like to see wider tires on both the front and back. I would also like to see chairs that were not all chrome, so that they don't have that "hospital look." If wheelchairs could be manufactured so that they could get across any kind of terrain, that would be wonderful. I'd like to help anyone who wants to design that.

QUESTION: "What modifications to the terrain are necessary to make recreation accessible to disabled people?

CHESTER LAND: "In Los Angeles, there's an accessible path to the Marina. We constructed a concrete path under the sand and put rails along it that you could move in and out of. If a person wants to go down to the water, there is a chair available so you won't get your chair all sandy and wet. You can transfer to the available chair and move on the concrete path down to the water. If you want to walk and use canes, you can do that.

MARRI TAYLOR: "Also I've been working with the state Department of Parks and Recreation and they are really willing to make all of the state parks accessible. I'm also working with the county Parks and Recreation Department. The more we can push to have our county parks and state parks accessible, the more disabled people will get out into the public. I've always run into an attitude with people who say, "I've never seen a disabled person here," and I look at the flight of steps or the rocks or whatever and I say, "Well, gee whiz, I wonder why?" It's hopefully up and coming. It's going to take a bit of doing, and unfortunately it's going to take a bit of money, but there is a need.

"We're not asking them to pave all their trails. We're asking them to make bathroom facilities accessible, to make drinking fountains accessible, a couple camp sites interspersed throughout the campground that could be made with a little harder-packed dirt or something like that. There's a new combination of asphalt and dirt and a couple of other weird things they put into it that can make a hard-pack trail. There is a trail in Northern California -- I'm not sure how long it is -- but it's a special project and a wheelchair can go the whole distance,a but that's unusual.

As a disabled person, I'm not asking for total accessibility; that's impossible. If I can't get from here to there, well, that's too bad, but if there's something that can be done easily, I'm all for it. I don't expect the whole world to be ramped; it's just not possible.

QUESTION: "How can transportation barriers to recreation be eliminated?

MARTI HACKER: "Transportation is truly the first barrier to recreation for disabled people. Because of the expense of specially-adapted vehicles, many disabled people do not drive. There is a tremendous need for inexpensive transportation for disabled people, preferably our own vehicles. Unfortunately, few solutions have been found, although some seem obvious. For example, severely disabled wheelchair users who want to drive have no choice except to use a modified van. Vans cost considerably more than cars, not to mention the cost of gas and upkeep. One possible solution would be a small car with seats removed, allowing the wheelchair user to enter from the back of the car, in the wheelchair, from which he or she would also drive. Such a set-up would also eliminate the need for an expensive lift. In addition to getting to recreational events, driving itself can be a form of recreation. Motorcycles driven from a wheelchair in a sidecar have implemented this idea. Other vehicles, such as street-legal golf carts, double as recreation and transportation for some disabled people. Of course, modified bicycles, either three wheelers or bicycle attachments for wheelchairs, serve the same purpose for short distances.

QUESTION: "What barrier does cost play in prohibiting the availability of chairs and other sports equipment to average consumers?

ROY GASH: "Wheelchair sports have helped the development of the wheelchair tremendously. Many individuals are now designing their own chairs, and this is bringing about some excellent technology. Price is still a major barrier. For example, if a wheelchair basketball team purchases ten basketball chairs commercially, the cost can exceed $10,000. However, if they have a welder or a mechanic on the team, they can make all their chairs for $1,000, less the wheels.

QUESTION: "What types of ski equipment have been developed for physically disabled individuals?

ROY GASH: "There are currently several types of snow skiing equipment on the market. These include snow sleds which are compatible with ski lifts. There are several large ski areas which have equipment to loan as well as instruction for disabled skiers. Peter, why don't you describe the ARROYA?

PETER AXELSON: "The ARROYA is a sled-like device constructed of reinforced fiberglas. Stainless steal edges on the bottom surface allow for turning and stopping on varying terrain and in varying ski conditions. The ARROYA addresses the neglected recreational needs of disabled persons who would benefit from integration into the whole of society. The responsible application of technology toward ski-sled design development and the establishment of downhill ski-sledding protocol will allow ski programs for the disabled to offer integrative downhill skiing to just about every one.

QUESTION: "How has the ARROYA been received by disabled and non-disabled skiers?

PETER AXELSON: "Demonstrations of the ARROYA ski-sled at various instructor clinics throughout the United States and in Norway generated very positive publicity. Each clinic received local newspaper coverage and some received television coverage. The objective of this publicity was to make individuals aware of the opportunity for paraplegics to use the ARROYA ski-sled and to increase general public awareness of the disabled community.

"Unlike many other sports and recreational activities available to the disabled person, the ARROYA allows a ski-sled user to interact naturally with skiers using other types of adaptive equipment (i.e., skis, boots, poles, etc.). This type of interaction between ambulatory and non-ambulatory individuals is not found in "wheelchair sports" (many recreational activities for paraplegics and quadriplegics tend to segregate them from their ambulatory friends.) In fact, able-bodied individuals also enjoy skiing in the ski-sled. It is therefore possible that this ski-sled will be used by both ambulatory and non-ambulatory individuals.

"One of the things we have had difficulty with is getting outside funding for this kind of work. We have submitted proposals but funding sources don't always recognize that recreation actually needs research. We are going to continue to monitor the evaluation process of the last prototype sled so that we can find a manufacturer that will continue with the next prototype.

QUESTION: "Are disabled people who cannot or do not wish to be involved in competitive sports relegated to physical inactivity?

MARTI HACKER: "There are other recreational activities which provide excellent ways of improving muscle tone, coordination, circulation, and cardio-vascular endurance. Most recreational sports are adaptable for many disabled people; the type and degree of disability determine the modifications necessary. Swimming is a sport that can be enjoyed by almost everyone. Adaptations for pools include lifts and sloping access for wheelchairs.

"Bowling is another sport that has been adapted for disabled people. A special chute can be used for those who are unable to roll the ball themselves.

"Sailing requires help setting up the boat and getting in and out of it -- a possibility for technology.

"Waterskiing is another sport that has recently

been adapted for disabled enthusiasts. In San Diego a ski chair called the Aquabat is used. This device consists of a seat attached to two short skis and handlebars. Some type of easily or automatically released hand gripper needs to be designed for those with insufficient hand strength.

"These are but a few of the activities which are alternatives to competitive sports. One final word -- for wheelchair users, each improvement made in everyday chairs makes participation in recreation easier and more fun.

CHESTER LAND: "The disabled community is now beginning to move into the mainstream. How many men as children wanted to be football players but were not big enough, or wanted to be basketball players but were not tall enough? Those were handicapping conditions. The same situation is now beginning to occur among individuals who use wheelchairs. Everyone is not going to be able to play wheelchair sports, but the same leisure feeling can be derived from other recreational sports.

MARRI TAYLOR: "For me, fishing is something very individual that makes me feel great. I look upon fishing as a competitive sport as well as basketball or anything else. Whether I am going to get that little fish or not is competition enough for me.

QUESTION: "How do individuals who have not been involved in wheelchair sports gain access to communication networks that exist among technology experts?

MARRI TAYLOR: "Valuable information exchanges exist among local communities of disabled athletes, sports enthusiasts, and small businesspeople. A major challenge for the future will be to involve small businesspeople in manufacturing innovations as they come out of the wheelchair competitions. Sports and Spokes is a valuable publication which contains useful information about wheelchair sports and equipment.

QUESTION: "Are there any national centers where individuals with disabilities can receive specific training in sports and recreation?

MARRI TAYLOR: "The Vinland National Center in Loretto, Minnesota is a national healthsports center which offers training to disabled and non-disabled individuals. This center provides workshops which focus on skill building in a wide range of physical activities, as well as in the area of health promotion, stress management, disability education, and medical self-care skills. Canoeing; running/jogging; swimming; weight and circuit training; cross country skiing; pulk skiing and ice sledding; archery; wheeling; and poing are some of the skill areas that are addressed by the center. Vinland also published Vin-Lines, a quarterly newsletter.

Summary

"The right to enjoy leisure time through a variety of sports and recreational opportunities is the right of all individuals, including individuals with disabilities. The benefits involved from participation in recreation and leisure pursuits are far-reaching, and include physical, emotional, and psychological benefits.

"Wheelchair sports have opened up sports participation to wheelchair users. As the popularity of these sports increases, new developments in wheelchair design are introduced. The popular use of chairs in basketball, track, tennis and other sports has promoted the growth of a new generation of wheelchairs for the active user.

"Other forms of sports equipment are being developed by the rehabilitation engineering community. Bicycles and ski equipment are two areas undergoing current research and development. Camping and wilderness activities are also becoming more accessible as national parts and local camping areas begin to make provisions to include persons with disabilities.

"As persons with disabilities continue to make their recreation and leisure needs known, advances in technology will continue in this important area. As disabled and non-disabled people continue to play together, technology for recreation will expand and increase access to this life area."

Addresses of Organizations Referred to in This Excerpt

Mission Bay Aquatic Center
1001 Santa Clara Point
San Diego, CA 92109

Phil Wood & Company
153 West Julian
San Jose, CA 95110
408/298-1540

Sports 'n' Spokes Magazine
5201 North 19th Avenue, Suite 111
Phoenix, AZ 85015
602/246-9426

Vinland National Center
3675 Ihduapi Road
P.O. Box 308
Loretto, MN 55357

SPORTS

"There is hardly any sport in which persons with disabilities do not take part, nor any disability for which there are no special organized games or olympiads. The opportunities range from local sports (school, community center, etc.) up to state, regional, national, and international competitions.

"During and immediately following World War I, interest developed in sports for those persons with amputations and visual impairments. Then, in 1944, the Spinal Injuries Centre at Stoke-Mandeville Hospital in Aylesbury, England, initiated wheelchair sports. In 1962, the British Commonwealth Paraplegic Games were founded and held in Perth, Western Australia. The Pan-American Wheelchair Games were held for the first time in 1967 in Winnipeg, Canada, and have continued successfully in various countries every fourth year. In the 1970's the World Zone Games were initiated; and in 1975, the first Far Eastern and South Pacific Games for disabled persons were held in Oita, Japan. In 1976, the United States Association of Blind Athletes was founded. Also in 1976, the Olympiad for Disabled People was initiated and almost 1,700 athletes with varied disabilities competed. The Annual International Cerebral Palsy Games were started in 1979. And the list of sporting events goes on.

"Sports programs enable disabled persons to develop physical skills and fitness, experience the challenges of competition and the thrills of victory, and be provided with opportunities to help organize and operate sophisticated national and international programs.

"For disabled persons to participate fully in a sport, however, equipment, performance technique, and game rules may need to be modified."

Sports for Disabled Individuals, Rehab Brief, Vol IV. No. 3, Jan. 26, 1981.

DISABILITY-RELATED SPORTS ASSOCIATIONS

These groups may be able to provide information on useful applications of technical aids.

American Athletic Association of the Deaf
3916 Lantern Drive
Silver Spring, MD 20902

Amputee Sports Association
George C. Beckmann, Jr., President
11705 Mercy Blvd.
Savannah, GA 31406
919/927-5408

Blind Outdoor Leisure Development (BOLD)
533 E. Main Street
Aspen, CO 81611

Canadian Wheelchair Sports Association
333 River Road
Ottawa, Ontario
CANADA K1L 8B9

Disabled Sportsmen of America
P.O. Box 26
Vinton, VA 24179

International Committee of Silent Sports
Gallaudet College
800 Florida Avenue, nE
Washington, DC 20002
202/651-5114 (voice or TDD)

International Games for the Disabled
Eisenhower Park
East Meadow, NY 11554
516/542-4493

International Sports Organization for the Disabled
International Stoke Mandeville Games Federation
Stoke-Mandeville Spinal Injury Center
Aylesbury, England

Mobility International USA
P.O. Box 3551
Eugene, OR 97403
503/343-1284

National Association of Sports for Cerebral Palsy
United Cerebral Palsy Associations
66 E. 34th Street
New York, NY 10016
212/481-6359

National Handicapped Sports & Recreation Association
Capital Hill Station
P.O. Box 18664
Denver, CO 80218
303/978-0564

National Inconvenienced Sportsman's Association
3738 Walnut Avenue
Carmichael, CA 95608
916/484-2153

National Inconvenienced Sportsman Association
2215 Allegheny Road
El Dorado Hills, CA 95630

National Wheelchair Athletic Association
2107 Templeton Gap Road, Suite C
Colorado Springs, CO 80907
303/632-0698

Outdoor Experimental Education for the Hearing Impaired
National Technical Institute for the Deaf
Rochester Institute of Technology
1 Lomb Memorial Drive
Rochester, NY 14623

Paralyzed Veterans of America
801 18th Street NW
Washington, DC 20006
202/872-1300

Special Olympics
Joseph P. Kennedy Foundation
1701 K Street NW, Suite 203
Washington, DC 20006
202/331-1346

Sports for the Physically Disabled
333 River Road
Ottawa K1L 8B9
CANADA

United States Amputee Athletic Association
Route 2, County Line
Fairview, TN 37062
615/670-5453

U.S. Association of Blind Athletes
55 West California Avenue
Beach Haven, NJ 08008
609/492-1017

United States Wheelchair Sports Fund
c/o Nassau Community College
Garden City, NY 11530
516/222-1246

Vinland National Center
3674 Ihduapi Road
Loretto, MN 55357

These national organizations and agencies have shown an active interest in the development of recreation programs for people with disabilities.

American Alliance for Health, Physical Education, Recreation and Dance
1900 Association Drive
Reston, VA 22091

American Camping Association
Bradford Woods
Martinsville, IN 46151

American Corrective Therapy Association
4910 Bayou Vista
Houston, TX 77091

Boy Scouts of America
P.O. Box 61030
Dallas/Ft. Worth Airport, TX 75261

Camp Fire, Inc.
4601 Madison Avenue
Kansas City, MO 64112

Girl Scouts of the U.S.A.
830 Third Avenue
New York, NY 10022

Information and Research Utilization Center (IRUC)
American Alliance for Health, Physical Education and Recreation (AAHPER)
1201 16th Street, N.W.
Washington, D.C. 20036
(202) 833-5541

National Park Service
Division of Special Programs and Populations
U.S. Department of the Interior
Washington, DC 20240

National Recreation and Park Association
1601 N. Kent Street
Arlington, VA 22209
703/525-0606

National Therapeutic Recreation Society
1601 N. Kent Street
Arlington, VA 22209
703/525-0606

Outdoor Recreation Technical Assistance Clearinghouse
Heritage Conservation and Recreation Service
Department of the Interior
Washington, D.C. 20240
(202) 343-7962

Also see organizations listed under each activity.

Vinland National Center
3675 Ihduapi Road
P.O. Box 308
Loretto, MN 55357

The Vinland National Center is a health education/sports center for persons with disabilities. It is located twenty-three miles west of Minneapolis. The Vinland National Center was started in 1976 with a Bicentennial gift of one million kroner from Norway to the American people. Modeled after the Norwegian healthsports center, Beltostolen, Venland promotes healthy lifestyle changes, as well as a high quality of life and better health through healthsports training. The "Vinland Concept" represents a holistic approach to rehabilitation. Vinland provides a national outreach follow-up and support programs for its graduates when they leave the center and return to their home communities. In addition, training manuals and curriculum guides are available for sale to disabled persons, family members, and health care, rehabilitation and education professionals on physical fitness training, sports and recreation skills, personal development and health promotion topics. For further information on courses, applications and financial aid, contact The Vinland National Center directly; the phone is 612/479-3555, voice or TTY.

WHEELCHAIR SPORTS

SPORTS WHEELCHAIRS

The first edition of this guide reprinted part of an article "Scoring in the Sports Wheelchair Market" from Rx: HomeCare, May 1982, by Richard Salzberg. The directory was felt to be a representative guide to major manufacturers of wheelchairs and other recreational transport. Because of the many exciting developments in this area within the past two years, this article is now out of date; a more recent survey is:

"Survey of 1983 Sport Wheelchair Manufacturers," written by the editors of Sports 'n' Spokes magazine, in Paraplegia News, September 1983. This article is the first in what is planned to be an annual feature comparing manufacturers and their products.

The field is changing so fast that the Guide is already somewhat out of date. For the most current information, contact the manufacturers listed, or your local sales representative. Many of the companies have wheelchair athletes on staff. For comparative information, get in touch with wheelchair athletes in your area.

For a different point of view, see "Tackling the Sports Wheelchair" by Debra Zauzmer, in RxHome-Care, November, 1983. This articles provides the dealer's perspective on the sports wheelchair market. It includes a section, "Getting in on the Action," which suggests ways dealer support can be shown.

The new developments in sports wheelchairs are profoundly influencing wheelchair developments. Expect to see a lot of advertising about new products, and many articles written in both trade journals and consumer-oriented publications.

SOME MANUFACTURERS OF SPORTS WHEELCHAIRS

Bair Chair
#6 Seco Court
Sacramento, CA 95823
916/427-1035

Canadian Wheelchair Manufacturing
1312 Blundell Road
Mississauga, Ontario CANADA L4Y 1M5
416/275-3960

Equalizer
274 Buchon St.
P.O. Box 1296
San Luis Obispo, CA 93401

Everest & Jennings, Inc.
3233 East Mission Oaks Blvd.
Camarillo, CA 93010
805/987-6911

Hall's Wheels
15 Marlboro Street
Belmont, MA 02178
617/489-3246

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035
800/321-5715

Mastercraft Metal Products
P.O. Box 591
Santa Cruz, CA 95061
408/426-6313

Motion Designs, Inc.
1075 Cole
Clovis, CA 93612
209/298-1718

Orthopedia GMBH (Germany)
U.S. Distributor:
International Medical Equipment
11000 Rush Street #20
South El Monte, CA 91733

Ortop Technical Medical Aids (Israel)
U.S. Distributor:
Meditech
544 10th Street
Palisades Park, NJ 07650
201/974-0500

Poirier Wheelchair (France)
U.S. Distributor:
Magnum International
2930 West Central
Santa Ana, CA 92704
714/641-9696

Production Research Corporation
10217 Southard Drive
Beltsville, MD 20705
301/937-9633

Quadra Wheelchairs, Inc.
31117 Via Colinas
Westlake Village, CA 91362
213/991-6302
800/824-1068

Spinner Internationalab
Box 69, S-197 00 BRO Sweden
Telephone +46 758 42200
Telex 11370 SPIN S

Sports Chairs
3673 Procyon Avenue
Las Vegas, NE 89103
702/873-6493

Stainless Medical Products
9386 Dowdy Drive
San Diego, CA 92126
619/578-6820

Theradyne Corporation
21730 Hanover Street
Lakeville, MN 55044
612/469-4404
800/323-4014

Wheeler Dealers
P.O. Box 656
Avondale, AZ 95323

X-L Enterprises
2003 Palm Avenue
Chico, CA 95926
916/891-3535

PUBLICATIONS

"Competitive and Recreational Wheelchair Sports." Paralyzed Veterans of America. Washington, D.C. 1978, 8 pp. (Brochure)

Constitution and Rules, Training Techniques and Records. National Wheelchair Athletic Association. Woodside, NY, 1977, 131 pp.

"A Look at Wheelchair Sports and What's Happening in the Northwest." Stotts, Kathleen and Warren, G. Model Systems, Science Digest, Spring 1982.

National Wheelchair Athletic Association
2107 Templeton Gap Road, Suite C
Colorado Springs, CO 80907
303/632-0698

Paraplegia News, 5201 N. 19th Avenue, Suite 111, Phoenix, AZ 85015, (602) 246-9426. Monthly magazine published by Paralyzed Veterans, August 1981, Vol. 35, No. 8: "The Sporting Life," (special issue on wheelchair sports).

"The Psychology of Wheelchair Sports." Labanowicz, Stan, Ph.D., Therapeutic Recreation Journal, Vol. 11, No. 1, pp. 11-17, 1978.

Sports'n Spokes, 5201 N. 19th Ave., Suite 111, Phoenix, AZ 85015, (602) 246-9426, Magazine published bi-monthly on wheelchair competitive sports & recreation.

Wheelchair III -- Report of a Workshop on Specially Adapted Wheelchairs and Sports Wheelchairs. The report was developed out of the third in a series of workshops sponsored by RESNA and the Veterans Administration Rehabilitation Research and Development Service. Available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. $10.00.

FOR MORE INFORMATION ON WHEELCHAIR SPORTS

National Wheelchair Athletic Association
2107 Templeton Gap Road, Suite C
Colorado Springs, CO 80907
303/632-0698

Baseball

National Wheelchair Softball Association
P.O. Box 737
Sioux Falls, SD 57101

Basketball

National Wheelchair Basketball Association
110 Seaton Bldg.
University of Kentucky
Louisville, KY 40506
606/257-1673

Playing and Coaching Wheelchair Basketball. E. Owen. University of Illinois Press, Champaign, IL. 400 pages. 1979.

Football

Rehabilitation-Education Center
University of Illinois
Oak Street at Stadium Drive
Champaign, IL 61820

The Silver Wheels Wheelchair Football
109 Florence Avenue
Buffalo, NY 14114

Marathon Racing

International Wheelchair Road Racers Club
12710 N. 30th Street
Tampa, FL 33612
813/977-8824

National Spinal Cord Injury Foundation
369 Elliot Street
Upper Newton Falls, MA 02164

National Wheelchair Marathon
Paul DePace
380 Diamond Hill Road
Warwick, RI 02886

Motorcyling

Wheelchair Motorcycle Association
Dr. Eli Factor
101 Torrey Street
Brockton, MA 02401
617/583-8614

Softball

National Wheelchair Softball Association
P.O. Box 737
Sioux Falls, SD 57101

Tennis

National Foundation for Wheelchair Tennis
3857 Birch Street
Box 411
Newport Beach, CA 92660

International Foundation for Wheelchair Tennis
2203 Timberloch Place, Suite 126
The Woodlands, TX 77380
713/363-4707

WATER SPORTS

Boating

"Although boat modifications and adaptations cover a wide range, handholds and handrails are the most common additions. However, many disabled people do not need to make any significant modifications to their craft.

"There is a risk involved in boating (as in all sports), but safety regulations and procedures are designed to minimize this risk, even if all of it cannot be eliminated. However, since part of the challenge of boating is its risk, many of the benefits for the disabled persons would be lost if all the challenges of the sport were removed. Even so, every boater should wear, or have immediate access to, a properly fitted Personal Flotation Device. Aboard a small craft, the device should be worn at all times."

> "Sports for Disabled Individuals," Rehab Brief, Vol. 14, No. 3, January 26, 1981.

Disabled boaters have formed their own organization, the Handicapped Boaters Association, which seeks to further the safe participation of disabled people in recreational boating and related activities throughout the country. The association publishes a bimonthly magazine, Boating World Unlimited.

These programs have information on equipment selection and adapting equipment for boating:

Handicapped Boaters Association
P.O. Box 1134
Ansonia Station
New York, NY 10023

Wilderness Inquiry
2929 4th Avenue South
Minneapolis, MN 55408
612/827-4001

Mission Bay Aquatic Center
1001 Santa Clara Point
San Diego, CA 92109

Adapted Boating Program
Office of Parks and Recreation
Sailboat House
1520 Lakeside Drive
Oakland, CA 94612
415/444-3807

Publications

R.C. Adams, A. Daniel, A. & L. Rullman. "Para-Canoeing." Games, Sports and Exercises for the Physically Handicapped, 3rd Edition. Lea and Febiger, 600 Washington Square, Philadelphia, PA 19106. $28.50. 1982.

Advisory Panel on Water Sports for the Disabled, The Sports Council. Water Sports for the Disabled. The Hillingdon Press, Uxbridge, England.

American Red Cross. Adapted Aquatics: Swimming for Persons with Physical or Mental Impairments. Doubleday & Co., Inc., Garden City, NY. 1977.

American Red Cross. Methods in Adapted Aquatics: A Manual for the Instructor. American Red Cross, Washington, DC. 1977.

Camp Confidence. Waterfront Program-Summer. The Camp, Box 349, Brainerd, Minnesota 56401. 1973.

John Chartres & Douglass Hurndall. "They Said We Couldn't Do It." RYA Seamanship Foundation, Victoria Way, Working, Surrey, GU12 IEQ England. 1981.

Nancy Crase. "Wheelchair Boating." Sports 'n Spokes, 1 (4), 11-14, November-December 1975. Describes various types of boats suitable for people in wheelchairs.

Diane Duryea. "Another Kind of Handicap." Yachting, October 1976, 86-87.

Matthew Guidry. "The Challenge -- Expanding Horizons of Aquatic Programs for the Handicapped." Presentation at Project Aquatics Workshop, Seattle, WA, and Columbia, MO. November, 1975.

Handicapped Boaters Association. "Boating World, Unlimited." January-February 1981, Vol. 1, No. 1. New York, NY.

Bob Hawkes. "Sailing: If One Paraplegic Sails - Others Surely Can Too!" Sports 'n Spokes, Nov-Dec, 1977, 3 (4), 8-9

Harold Hayes. "Sailing Blind." The New Beacon, December, 1970. Royal National Institute for the Blind, London, England.

Eugene Hedley, Ph.D. Boating for the Handicapped: Guideline for the Physically Disabled. Human Resources Center, Albertson, NY. 1978.

Carol Hogan. "She Took Her Wheels to Sea." Sail. United Marine Publishing, Inc., Boston, MA. Dec. 1977, pp. 88-90.

Human Resources Center. National Recreational Boating for the Physically Handicapped: Strategy Paper and Annotated Bibliography. Human Resources Center, Albertson, NY. 1978.

Syd Jacobs. Information on Whitewater Kayaking for the Handicapped. 209 Columbus, Port Angeles, WA 98362, 206/452-4253.

Wallace J. Lynch. "Canoeing for Recreation and Rehabilitation." Parks and Recreation, 1972, 20-21, 46.

Tim Marshall. "Solo Sail Racing: The Challenger - a Tri-maran That's Fast, Safe and Accessible." Sports 'n Spokes, March-April 1980 5(6), 5-6.

Lee Anna Mielzarek & Rolf H. Mielzarek. "Reaching Out + Reasonable Risk = Growth Adventure." Challenge, November 1975, 11 (1); 1, 3

Oral O. Miller. Four Years at the Oars. 3701

Connecticut Avenue, NW, Washington, DC.

National Easter Seal Society for Crippled Children and Adults. Year-Round Recreation Programs for the Handicapped. National Easter Seal Society, Chicago, IL. 1973.

Oakland Office of Parks and Recreation. Open Boating. Oakland Office of Parks and Recreation, Water Safety and Boating Program for the Disabled, 1520 Lakeside Drive, Oakland CA 94612. 1982. A handbook about Lake Merritt's Adapted Boating Program for the Disabled. Chapter 4 has a description of facilities, equipment considerations and categories, building and stocking a work space. Chapter 5 describes a team approach to teaching, designing and making adaptive equipment and devices. An award-winning documentary, "Open Boating," is also available in either 16 mm film or videotape formats.

David C. Park. "Recreation." The White House Conference On Handicapped Individuals, Vol. I: Awareness Papers, pages 119-131. Washington, D.C. May 1977.

Joan Reed. "Sightless Sailing...a Reality in Seattle." Nor' Westing, Dec. 1977, 13(2), 7-13.

Scuba

Articles on divers' nutrition, physical fitness and beach accessibility are the fare in a new publication for physically handicapped people who scuba dive or who would like to learn how to scuba dive. Scuba Quarterly Undersea International Digest (SQUID), published by the Handicapped Scuba Association, offers diving advice and information from experts in underwater education. SQUID also sponsors a national form where diving instructors discuss scuba teaching tips, results, and suggestions. Subscriptions cost $18.00 per year, and are available from:

Handicapped Scuba Association, 1104 El Prado, San Clemente, CA 92672. 714/498-6128.

Another organization with information on this area is:

Professional Association of Diving Instructors, 2064 N. Bush Street, Santa Ana, CA 92706.

Some publications are:

Scuba Diving for the Handicapped Project. Michael Beeman. Handicapped Scuba Association, 1104 El Prado, San Clemente, CA 92672. 21 pages. June 1978.

Scuba Diving for Physically Handicapped Program. James Cesario. Institute of Rehabilitative Medicine, 400 E. 39th Street, New York, NY 100016, 212/679-3200, ext. 217.

Water Skiing

Water skiing can be a new and exciting recreational experience for many disabled people. The American Water Ski Association has indicated its interest in working with groups to help introduce the sport to people with disabilities.

American Water Ski Association, Attention: Bruce Kister, P.O. Box 191, Winter Haven, FL 33880.

Waterskiing for the Physically Disabled. Mission Bay Aquatic Center, 1001 Santa Clara Point, San Diego, CA 92109. This manual is a guide for the summer camp, school, recreation department or any other group that wishes to institute a disabled waterski program. It includes instructions for adapting a monoski and one skiseat.

Water Sports

Water Sports for the Disabled. Sterling Publishing Co., 2 Park Avenue, New York, NY. $16.95. 1983.

WINTER SPORTS

"Many disabled people can now enjoy skiing and skating. In 1971, the Winter Park Handicap Recreational Program in Winter Park, Colorado, began to teach people with amputations how to ski. Now, people with 29 different types of disabilities are also taught to how to ski. At some winter resorts, a blind skier may take to the slopes in tandem with a sighted companion who provides directions by verbal command or by means of a light harness. One-legged skiers are equipped with two arm-braced outrigger skis to give them a three-pronged balance.

"Beginning ice skaters who lack muscle strength, coordination, or who are overanxious may use a skate aid for support until they gain confidence. The collapsible aid is used much as a chair is used for support, but the aid is more stable and evenly balanced. Although blind and deaf people need no special equipment for skating, blind skaters would probably feel more secure with sighted partners, and a source of music centrally located may be helpful for orientation."

From "Sports for Disabled Individuals,"
Rehab Brief
Vol. IV, No. 3, Jan. 26, 1981

Skiing

Arroya: a downhill skiing system specially designed for persons with physical disabilities. Arroya User/Instructor Manual available from: Peter W. Axelson, Rehabilitative Engineering Research & Development/153, 3801 Miranda Avenue, Palo Alto, CA 94304, (415) 493-5000 x4473.

Colorado Outdoor Education Center, P.O. Box 697, Breckenridge, CO 80424; (303) 453-6422.

Kick the Handicap, Learn to Ski: A Handbook of Information for the Physically Handicapped. Stieler, William E. Marlette, Michigan. Adapted Sports Association, 1977, 123 pp.

National Amputee Ski Technique. National Amputee Skiers Association. Carmichael, CA 1970, 91 pp.

Pulk Skiing: Sled skiing and ice sledding for persons with mobility impairments. 1981. Larry Orr, Vinland National Center, P.O. Box 308, Loretto, Minnesota 55357.

The Winter Park Amputee Ski Teaching System, O'Leary, H. Available from Winter Park Ski School, P.O. Box 313, Winter Park, CO 80482, (303) 726-5514 x179.

INTEGRATED SKIING: In an effort to facilitate integrative recreational sporting activities, a downhill skiing system called the ARROYA was introduced in 1979 at the National Handicapped Skiing Championships. Development of the ARROYA downhill skiing concept was funded by the Rehabilitative Research and Development Center at the Palo Alto Veterans Administration Medical Center.

The ARROYA is a simple sled-like device with no moving parts. The skier learns to control the direction and speed of the ARROYA by developing various downhill skiing skills. The ARROYA consists of four stainless steel edges that face inward beneath a composite shell. The skier sits in a molded seating system that links the user to the sled much like the traditional downhill skiers foot is secured within a ski boot. The ARROYA is currently being manufactured by Beneficial Designs, 5858 Empire Grade, Santa Cruz, CA 95060. A list of skiing programs that use Arroya can be obtained from Beneficial designs. A cross-country sled is available from Mountain Smith, Inc., 12790 W. 6th Place, Golden, CO 80401, (303) 238-5823.

For more information on training programs and events related to pulk skiing, sled skiing, ice sledding and dog sledding:

Alaska

Alpine Alternatives
1634 W. 13th
Anchorage, Alaska 99501
(907) 276-7526
Marty Decker, Director

Arizona

Handicapped Unbound, Inc.
P.O. Box 1044
Prescott, AZ 86302

California

Environmental Traveling Companions
Fort Mason, Bldg. C
Room 3B
San Francisco, CA 94123

NHYSRA Lake Tahoe Chapter
Larry Young
Box 1636
Truckee, CA 95734
(Incline Village, Lake Tahoe)
(916) 587-3911
(Alpine)

Tahoe Handicapped Ski School
P.O. Box 2633
Olympic Valley, CA 95730
(916) 583-7584
Katherine Hayes, Director

Colorado

Colorado Outdoor Education Center
P.O. Box 697
Breckenridge, CO 80424
(303) 453-6422
Bruce Werber, Director

Ed Luchs
P.O. Box 5429
Snowmass Village, CO 81675
(303) 923-3294
(Alpine)

13:

Horizons for the Handicapped
P.O. Box 2143
Steamboat Springs, CO 80477
(303) 879-4466

Horizons for the Handicapped
Laura Canfield
P.O. Box 2143
Steamboat Springs, CO 80477
(303) 879-4466
(Alpine)

Winter Park Recreational Assoc.
Box 36
Winter Park, CO 84082
(303) 726-5514, ext. 179
(Alpine)
Hal O'Leary, Director

Connecticut

United Deaf Skiers Association
Attention: Mr. Gutfran
Two Sunset Hill Road
Simsbury, CT 06070
(203) 244-3070

Minnesota

Courage Alpine Skiers
c/o Courage Center - Duluth
Duluth, MN 55802
(218) 727-6817
(Alpine skiing)

Lynx Track - Will Steger
P.O. Box 785
Ely, MN 55731
(Interdisciplinary programs in dog-sledding and winter travel)

Minnesota Outward Bound School
308 Walker Avenue South
Wayzata, MN 55391

Ski for Light - HEALTHsports, Inc.
1455 W. Lake Street
Minneapolis, MN 55408
(612) 827-3611
(Annual February week-long X-C Ski event with blind/sighted/mobility impaired also regional events)

Vinland National Center
3675 Ihduapi Road
Loretto, Minnesota 55357
(612) 479-3555
Larry Orr/Director

Wilderness Inquiry II
2929 4th Avenue South
Minneapolis, MN 55408
612/827-4001
(Summer and winter travel programs)

New Hampshire

Outdoor Wilderness Program
Crotched Mountain Center
Greenfield, NH 03047

New York

Outdoor Experimental Ed. for the Hearing Impaired
National Technical Institute for the Deaf
Rochester Institute of Technology
1 Lomb Memorial Drive
Rochester, NY 14623

Utah

Adaptive Outdoor Recreation
Ken Sleight Expeditions
349 S. 600 East
Salt Lake City, UT 84103

Peter Mandler
2273 Aubur Lane, Apt. 6
Salt Lake City, UT 84117
(Snowbird; Alpine)
(801) 272-7420

Washington

Ski for All Foundation
521 Wall Street, Suite 326A
Seattle, WA 98121 (Snoqualmie Ski Summit)
(206) 623-2714
(Alpine)
Chris Colb, Executive Director

International

Track Three Ski
Box 1260
Station Q
Toronto, Ontario
CANADA M4T 2P4

Karsten Inde
Maraton Produkter
Ekbacka 19700BRO
Sweden 0758140522
Postgro 878391-2
Barkgiro 289-8500

New Zealand Assoc. for Disabled Skiers
P.O. Box 2417
Christchurch, New Zealand
Gillian Hall/Director

SKATING

International Council on Therapeutic Ice Skating
P.O. Box 13
State College, PA 16801

OTHER SPORTS

Bowling

American Blind Bowling Association
15 N. Bellaire Avenue
Louisville, KY 40206

American Wheelchair Bowling Association
Robert Moran, Executive Secretary
6718 Pinehurst Drive
Evansville, IN 47711
812/862-6503

Wheelchair Bowling. Jim Lane and Dick Schaaf (eds.) Available from: Wheelchair Bowlers of Southern California, 6512 Cadiz Circle, Huntington Beach, CA 92647. Softcover. 96 pages. $7.95 plus $1.00 shipping.

Golf

The Amputee Golfers Association
Lakeview Terrace Watchung, NJ 07060

Dennis Walters, Jr.
8952 NW 10th Street
Pembroke Pines, FL 33024

John Klein
1016 Cliff Drive
Santa Barbara, CA 93109

National Amputee Golf Foundation
George C. Beckman, Trustee
Warm Springs, GA 31830

Peter Longo Golf Show
P.O. Box 27283
Temple, AZ 85282

Western Amputee Golf Association
Ed Bryant, Sec. Treasurer
118 W. Swain Road
Stockton, CA 95207

Flying

Flying has attracted increasing numbers of disabled people with the availability of FAA-approved portable hand controls. Boarding seats and/or door modifications are helpful in improving accessibility for some types of aircraft. There are several wheelchair pilot groups around the country that encourage and support private flying and help steer disabled participants through the licensing bureaucracy.

American Wheelchair Pilots Association
Dave Graham
P.O. Box 1181
Mesa, AZ 85201
(602) 831-4262

California Wheelchair Aviators
Bill Blackwood
1117 Rising Hill Way
Escondido, CA 92025
(Paraplegia flight instructor. Information on planes, instruction, hand controls, cockpit accessible wheelchairs.)

Soaring Society of America, Inc.
Box 66071
Los Angeles, CA 90066
(213) 390-4448

Ed Stadleman
P.O. Box 207
Sturgis, Kentucky 42459
(Aircraft hand controls.)

Union Aviation Inc.
Sturgis Airport - G
Sturgis, KY 42459
(In residence pilot training for disabled people, portable aircraft hand controls.)

Wheelchair Pilots Assoc.
11018 102nd Avenue, N.
Largo, FL 33540
(813) 393-3131

Some publications on flying are:

"Flying Beyond the Handicap". Kenneth W. Smith. AOPA Pilot, October 1982, pages 68-73.

"A Multi-Purpose Recreational Vehicle for the Disabled", Nigel Shapcott, R.E., and Michael Heirich, R.E. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

"Powered Ultralights and the Disabled Pilot", Michael J. Heinrich, R.E., and Nigel Shapcott, R.E. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983

Horseback Riding

North American Riding for the Handicapped Association (NARHA)
Box 100
Ashburn, VA 22011

National Foundation for Happy Horsemanship for the Handicapped
Box 462
Malvern, PA 19355

Hunting & Fishing

Disabled Sportsman of America
P.O. Box 26
Vinton, VA 24179

ADDITIONAL PUBLICATIONS: SPORTS AND RECREATION

Access to Recreation. Architectural and Transportation Barriers Compliance Board. Washington, D.C., 1977, 70 pp.

Bibliography on Recreation, Play and Sports. Rehabilitation International. Postfach 101 409, 6900 Heidelberg, Federal Republic of Germany, 1975.

Competitive Athletic Programs for Impaired, Disabled and Handicapped Persons. American Alliance for Health, Physical Education and Recreation. Washington, D.C., 1973, 18 pp.

Directory of Recreation & Leisure Services - For the physically handicapped in the Los Angeles area. 132 page directory $7.95 + tax & mailing. Christianson, Mickey A., 11066 Gonsalves Place, Cerritos, CA 90701, (213) 924-2159. Available from: author.

Equipment for the Disabled, Vol. 6, Leisure and Gardens. National Fund for Research into Crippling Disease. 2 Foredown Drive, Postslade, Brighton, BN4 2BB, England.

"Familiar Sports and Activities Adapted for Multiply Impaired Persons." PAM Repeater, No. 22, February, 1984. Published by the PAM Assistance Centre, 601 Maple, Lansing, MI.

Games, Sports and Exercises for the Physically Handicapped, 3&d edition. Adams, R.C., Daniel, A. & Rullman, L. Lea and Febiger, Philadelphia, PA, 1982. $28.50, 400 pages.

Outdoor Pursuits for Disabled People. Croucher, Norman. 1981, 180 p. Woodhead-Faulkner Ltd, 8 Market Passage, Cambridge CB2 3PF, England. 4.75 Ls.

Physical Activities for the Handicapped. Vannier, Mary Helen. Prentice Hall, Inc., Englewood Cliffs, NJ 01632, 1977, 338 pp.

Physical Activities for Individuals with Handicapped Conditions. Delores Geddes. 2nd edition, 1978. C.V. Mosby Company, St. Louis, MO.

Recreation: A Bibliography. National Easter Seal Society, 2023 West Ogden Avenue, Chicago IL 60612. Revised annually.

Recreation and Leisure for Handicapped Individuals Resource Guide. U.S. Department of Education, Office of Human Development Services, Office for Handicapped Individuals, DHEW Publication No. (OHDS) 79-22004.

"Recreation for the Disabled", Jo Lockhart, MS. A chapter in Disability and Rehabilitation Handbook, Goldenson, et al., McGraw-Hill, 1978.

Recreation for Physically Handicapped. Pomeroy, Janet. Macmillan Publishing Company, 866 3rd Avenue, New York, NY 10022. (Out of print)

Sports and Games for the Handicapped, Reference Circular No. 79-1. National Library Service for the Blind and Physically Handicapped, The Library of Congress, Washington, DC. 1979.

Sports and Recreational Programs for the Child and Young Adult with Physical Disability. Proceedings of the Winter Park Seminar, Winter Park, CO, April 11-13, 1983, $10 prepaid from the American Academy of Orthopaedic Surgeons, PO Box 7195, Chicago, IL 60680. How to assess the orthopaedically disabled child's activity, possible adaptations for various sports and recreational activities, available program resources, competition classifications, and bibliography.

Sports Centers and Swimming Pools. Walter, Felix. Disabled Living Foundation, 346 Kensington High Street, London W14, England, 39 pp., 2.00 pounds. Recommends design standards for sports facilities and swimming pools, and ancillary equipment for use by disabled persons.

"Teacher-made Adaptive Devices for Archery, Badminton, and Table Tennis." J. Cowart. Practical Pointers, May 1978, (13), 1-16. Contains guidelines for making adaptations of physical education equipment for students with disabilities. Adaptations are suggested for archery, badminton, and table tennis equipment. Each idea is designed to compensate for a specific functional limitation. Construction steps are described and drawings are provided.

Textbook of Sport for the Disabled. Guttman, Sir Ludwig. Alden Press, London, England, 1976, 184 pp.

Therapeutic Recreation and Adapted Physical Education within Rehabilitation. Collingwood, Thomas R. Hot Springs, Ark., Arkansas Rehabilitation Research and Training Center, 1971, 44 pp.

Vin-Lines. Quarterly newsletter from Vinland National Center, 3675 Ihduapi Road, P.O. Box 308, Loretto, MN 55357.

AUDIOVISUALS

Annotated Listings of Films: Physical Education and Recreation for Impaired, Disabled, and Handicapped Persons. American Alliance for Health, Physical Education, and Recreation. 3rd edition, 128 pp., ann. bibl., price: $7.95.

A Closer Look. Barbara J. Maresca. Available from Film Arts, P.O. Box 468, Graton, CA 95444. 16mm, color, 15 mins. 1981. Explores wheelchair experiences, focusing on wheelchair basketball, hiking, other activities, and design and maintenance of the chair. Phillip Morgan shows his design and construction of a lightweight wheelchair. Stresses mobility and independence.

Crystal Productions Catalog. Box 12317, Aspen, CO 81612, (303) 925-8160. List of sports & rehabilitation films: about amputee, C.P. & blind skiing, spinal cord injuries.

It's Ability That Counts. Rehabfilm/RFRL, 20 West

40th Street, New York, NY 10018. 16 mm, color, 32 minutes. Sale $365.00, rental $25.00. Sir Ludwig Guttman introduces this film which so effectively illustrates the results of his life work, interspersing competition at the Stoke-Mandeville Games with leisure activities.

Not Just A Spectator. Rehabfilm/RFRL, 20 West 40th Street, New York, NY 10018. 16 mm, color, 35 minutes. Sale $350.00, rental $25.00. A colorful and exciting film that covers a wide variety of leisure activities for the disabled, including spelunking, rock-climbing, sailing and water-skiing.

Riding Towards Freedom. Rehabfilm/RFRL, 20 West 40th Street, New York, NY 10018. 16 mm, color, 32 minutes. Sale $365.00, rental $25.00. Horseback riding for the disabled has come into its own, and Riding Towards Freedom shows all aspects of the activity from the organization of riding classes to mounting methods and games. The great value of the sport to all those involved is clearly demonstrated.

Water Free. Rehabfilm/RFRL. 20 West 40th Street. New York, NY 10018. 16 mm, color, 35 minutes. Sale $350.00, rental $25.00. The first in a series of specialized offshoots from Not Just A Spectator, Water Free explores swim-training for all ages and levels of skill in detail. It includes survival training and a swim in the English Channel.

SOME LOCAL RECREATION PROGRAMS

Arizona

Handicapped Unbound, Inc.
P.O. 1044
Prescott, AZ 86302
602/445-5076

California

Adaptive Physical Education
College of Marin
Sir Francis Drake Highway
Kentfield, CA 94904
Laurie Lanham, RPT
415/485-9654
Disabled Student's Office
415/485-9406

Adaptive Recreation Program
Andy Fleming, Coordinator
City of Santa Barbara
620 Laguna Street
Santa Barbara, CA 93102
Scuba diving for paraplegics.

Adaptive Rehabilitation Physical Education
De Anza Junior College
21250 Stevens Creek Blvd.
Cupertino, CA 95014
408/996-4873

All Seasons Riding Academy
Therapeutic Riding Program
43510 Osgood Road
Fremont, CA 94538
415/651-7390

Amputees in Motion (AIM)
1539 W. 11th Avenue
Escondido, CA 92025
Pam Stahl, President, San Diego
717/747-6054
Jerry Bahlquist, Coordinator
714/729-9403
Local chapters in San Diego and Los Angeles, social & sports get-togethers, hospital visitation program.

Berkeley Outreach Recreation Program
605 Eshleman Hall
University of California
Berkeley, CA 94720

California Wheelchair Athletic Association
P.O. Box 26483
San Jose, CA 95159-6483

Environmental Traveling Companions
Fort Mason, Building C
Room 38
San Francisco, CA 94123

Indoor Sports, Inc.
3445 Trumbell
San Diego, CA 92106

Orange County Riding Center, Inc.
Therapeutic Riding Program
Stables:
Lake Forest Riding Club
25201 Trabuco Road
El Toro, CA
Office
23011 Moulton Parkway, Suite C-6
Laguna Hills, CA 92653
714/837-8225 (office)
714/728-3669

Recreation Center for the Handicapped
207 Skyline Blvd.
San Francisco, CA
415/665-4100
Programs for children and adults.

Santa Barbara Community Golf Course
John Klein
3500 McCaw Avenue
Santa Barbara, CA 93105

Colorado

Colorado Outdoor Education Center for the Handicapped
P.O. Box 697
Breckenridge, CO 80424

Michigan

Adapted Sports Association, Inc.
Communications Center
6832 Marlette Road
Marlette, MI 48453

Minnesota

Courage Center
3915 Golden Valley Road
Golden Valley, MN 55422
612/588-0811

HEALTHsports, Inc.
Leslee Lane
1455 W. Lake Street
Minneapolis, MN 55408
612/827-3611

Wilderness Inquiry II
2929 4th Avenue South, Suite O
Minneapolis, MN 55408
612/827-4001

New Hampshire

Outdoor Wilderness Program
Crotched Mountain Center
Greenfield, NH 03047

Ohio

Adaptive Sports Program
Kinesiotherapy Clinic
University of Toledo
2801 West Bancroft Street
Toledo, OH 43606

Indoor Sports Club
1145 Highland Street
Napoleon, OH 43545
419/592-5756

Canada

Toronto Bulldogs Wheelchair Sports Club
c/o Lyndhurst Hospital
520 Sutherland Drive
Toronto, Ontario M4G 3V9 CANADA

LEISURE ACTIVITIES

For information, see also: National Organizations listed under SPORTS.

GARDENING

One of my favorite equipment catalogs is Smith & Hawken Catalog for Gardeners (25 Corte Madera, Mill Valley, California 94941, (415)383-4415).

It's always a joy to read -- beautiful photos and/or drawings, lively text, and a strong emphasis on quality products. Until the Spring '84 issue, my catalog always stayed at home. It now joins my "Technology for Independent Living" files, because Smith & Hawken has begun a section called "Enabling Tools:"

"We are proud to offer a selection of tools we call 'Enabling Tools.' This covers a broad area, and includes implements for older and younger people, for those whose limbs and muscles are not as strong as they once were, for the handicapped, or simply for people who want lighter and handier tools.... they include carts, kneelers, special grips and a wonderful selection of modular tools from Gardena in Germany.... Although Dave and I are still reasonably young and hearty, these tools will certainly find a place in our toolshed as they offer superior value and flexibility."

This integrated marketing approach is especially obvious in two of the entries:

"CHILDREN'S TOOLS

"These are scaled down versions of our regular tools for those with less muscle, less space or fewer years. They are built to the same quality specifications as all Smith & Hawken tools. One of the frustrations for children in beginning gardening is that no one has taken seriously the making of children's tools. These down-scale tools give the child an immediate sense of the purpose and effect of a normal tool, and are perfect teaching aids for classroom use. The T-handles permit small hands a good two-handed grip. Their durability allows years of use and wear. All of these tools are suitable for senior citizens or the handicapped, as well as for those who garden on balconies, rooftops, or patios."

"SUPERLIGHT TOOLS

"I discovered these on a recent trip to England, and almost overlooked them as they were being produced and sold by a company known solely for its excellent boat fittings. At first glance, I thought them to be aesthetically beautiful, but could not see their utility -- that is, until I picked one up. They are extremely light, and despite that, they are very strong. It would take a company making yacht fittings to realize the need for both strength and lightness. Each tool is made of aluminum allow that is anodized so that it will not oxidize and turn black as cast aluminum tools do. The Hoes and Edger weight just 24 oz., the Rake only 32 oz. They are perfect tools for everyone, but are ideal for those who cannot lift a heavier tool. Whether young or old, or simply disposed to the ease and convenience of a light tool, these will please all."

With this approach in mind, it becomes easier to evaluate other products in regular gardening catalogs to determine if they will meet your special needs. (editor)

Equipment for the Disabled: Leisure and Gardening (Fifth Edition). Edited by E.R. Wilshere and G.M. Cochrane. 1983. 109 pp. Oxford Regional Health Authority. 2 Foredown Drive. Portslade, Brighton, BN4 2BB, ENGLAND.

Leisure and Gardening has recently been updated. It is one in a series of volumes dedicated to presenting equipment related information to "those professionally concerned with the care of physically handicapped people of all ages.... [These books] provide guidelines to help in the selection of equipment and suggest ways of overcoming different problems." They can also be used directly by disabled people. The materials are useful and detailed; unfortunately, the fact that the volumes are compiled in England can be a limiting factor in using some of the material presented.

The section on gardening, however, is quite universal. Most of the equipment is available for export, or can be closely approximated in the U.S.

There are tips on setting up an accessible greenhouse, pruning one's trees with ease, and laying out an accessible and easy upkeep patio garden that can be used by persons anywhere.

One reviewer's comment was "Where else in the world can one go to locate comparative information on garden hoes for persons with disabilities?"

Greenhouse Design for the Handicapped. University of Nebraska, Lincoln, NE. 18 pp. 1967. Available from NARIC: NARIC Accession #EI 7701-002977.

MUSIC

Settlement Music School's Programs for the Handicapped, S. Archibald Leacock, Director

These programs began in 1976 as a pilot program with 30 students. Today these programs provide a creative and stimulating musical experience to almost 500 physically and visually disabled children and adults throughout the Delaware Valley, and have attracted both local and international attention. Distinguished violinist Itzhak Perlman is honorary chairman of The Therapeutic Music Program; jazz great George Shearing is honorary chairman of the Visually Handicapped Program.

The Settlement Music School plans to expand these programs to include a National Music Information

center for the Handicapped.

All disabled individuals are invited to share in these innovative and unique programs. For further information, contact Settlement Music School, Post Office Box 25120, Philadelphia, Pennsylvania, 19147; telephone (215)336-0400.

The National Technical Institute for the Deaf has adapted musical equipment for more than 500 deaf musicians by using amplification and equalization techniques. NTID uses the latest technical equipment to teach deaf students to check their pitch visually. Light emitting diodes indicate to deaf musicians the accuracy of their pitch. If the line of dots moves up, the pitch is sharp; if it moves down, the pitch is flat; and if the line of lights is stable, the musicians have the correct pitch. For more information, contact Bruce Halverson at 716/475-6253.

NOTE-ABLE

A newsletter on music for persons with physical limitations. The emphasis is on adapted musical instruments and methods which can be used by disabled people.

The newsletter is written by Paige Finnerty, a musician and vocational rehab counselor. To receive the next issue, send a self-addressed stamped enveloped to: NOTE-ABLE, c/o Rancho Los Amigos Hospital, 7601 E. Imperial Highway, 500 Hut, Downey, CA 90242.

Clinically Adapted Instruments for the Multiply Handicapped. Cynthia Clark and Donna Chadwick. Magnamusic-Baton, 10370 Page Industrial Blvd., St. Louis, Missouri 63132. Phone 314/427-5660. 192 pages. 1980. This book describes adaptations which can be made to a variety of melody and rhythm instruments (some of original design) used in music therapy. Photographs or drawings are included with each description.

Guide to the Selection of Musical Instruments with Respect to Physical Ability and Disability. Magnamusic-Baton, 10370 Page Industrial Blvd., St. Louis, Missouri 63132. 197 pages. 1982. This book describes in detail the physical mobility necessary to play most band and orchestral instruments. Each instrument is discussed in terms of range of motion, strength, dexterity, etc.

Make Your Own Musical Instruments. Muriel Mandell and Robert E. Wood. Sterling Publishing Co., Inc., 419 Park Avenue South, New York, NY 10016. 126 pages. 1977.

Treatment with Music: A Manual for Allied Health Professionals. Karen J. Miller, RMT, MOT, OTR/L. Techniques manual containing basic music activities, techniques, and equipment appropriate for use in the treatment of physical dysfunction. Barbara A. Rider, Chairperson, Occupational Therapy Department, Western Michigan University, Kalamazoo, Michigan 49008.

NEEDLEWORK

Creative Crochet. L. Calder. $7.95 plus $1.00 postage. Penguin Books, 625 Madison Avenue, New York, New York 10022. For those with the use of only one hand, the detailed design instructions and special basic technique make crocheting surprisingly simple. Illustrated in full color throughout. Paperback also available.

The Not-So-Nimble Needlework Book. Iris Rosenthal. Grosset & Dunlap, 51 Madison Avenue, New York, NY 10010. 160 pages, illustrations. Paper. $5.95. 1977.

Aids to Make You Able. Wendy Davis. Fred Sammons, Inc., Brookfield, IL. 114 pages. $6.95. 1979.

The Source Book for the Disabled. Glorya Hale, editor. Paddington Press, Ltd. Distributed by Grosset & Dunlap, New York. 1979.

"Sewing Machines." The English journal of the Consumers' Association, Which, joined with consumer organizations in nine other countries in a report on "electronic" sewing machines. As part of this international test, three sewing machines emerged which can be specially adapted for use by disabled people. These are: Bernina 830H (Handicap), Switzerland; Husqvarna Viking 6270, Sweden; and the Husqvarna Viking 6690, Sweden. The Bernina comes fitted with aids to make it more suitable for people with physical and sight disabilities. The Husqvarna machines can be supplied with kits; one for the physically handicapped and a second for the blind and partially sighted. In the report, the point was made that no sewing machine -- not even one specially adapted -- will suit everybody. The advice is, try out a variety of sewing machines before buying.

See also **CLOTHING**, page 62.

FITNESS

Adams, Ronald; Alfred Daniel and Lee Rullman. Games, Sports, and Exercises for the Physically Handicapped. 3rd ed. Lea and Febiger, Philadelphia, PA, 1975.

American Alliance for Health, Physical Education and Recreation. Testing for Impaired, Disabled and Handicapped Individuals. Washington, D.C.

Collingwood, Tom and Robert Carkhuff. Get Fit for Living. Human Resources Development Press, 22 Amherst Road, Amherst, MA 01002. 1976.

Dance Slimnastics Ltd. "Armchair Aerobics." Armchair Aerobics is a special exercise program developed by Dance Slimnastics. Designed for the physically limited person, all of its exercises can be done while seated. Dane Slimnastics Ltd., P.O. Box 367, Port Washington, WI 53074. 414/375-2502.

Iron Athlete Training Center, Mark Lescoe, Manager, 1940 E. University Avenue, Tempe, AZ 85281. Write for information about a personalized weight lifting program.

Milligan, G. Timothy. Fitness is Free, But You Have To Work For It. A physical fitness program for spinal cord injured persons. June 1979. Arkansas Rehabilitation Research and Training Center. University of Arkansas, Little Rock.

Milligan, Tim. Physical Fitness Training for Rehabilitation Clients. University of Arkansas, Little Rock, 1975.

Pollock, Dr. Michael L. "Arm Pedaling as an Endurance Training Regime for the Disabled." Archives of Physical Medicine and Rehabilitation, Volume 55. #9, September 1974, pp. 418-424.

Wheelchair Workout is $13.50 plus $1.00 postage. Write 12275 Greenleaf Avenue, Potomac, MD 20854.

TRAILS

There is a national network of special recreational facilities and "barrier-free" trails designed especially for people with disabilities. For more information on barrier-free trails and facilities in your area, contact the Forest Service Field Office nearest you. A complete list can be obtained free of charge by writing to: Recreational Staff, USDA Forest Service, PO Box 2417, Washington, DC 20013. Request Forest Service Publication No. 13.

TOYS AND GAMES

THE VALUE OF TOYS

Howard C. Shane
The Children's Hospital Medical Center
Boston, Massachusetts

"There seems to be a growing realization that toys should be an intricate part of childhood regardless of the presence of a handicapping condition. This becomes apparent if one talks with distributors of communication aids, visits evaluation centers for nonspeaking children, reads Communication Outlook or talks with persons interested in biomedical technology. There are countless numbers of children's toys marketed. Some require activation by another person through winding, cranking, blowing or puppeting which creates a relatively passive participation on the part of the child. Yet children generally attain skill levels requisite for independent interaction with these same activation mechanisms. In contrast, handicapped children have extremely limited opportunities to engage in independent toy manipulation. Irrespective of cost, the modified toys are simply fewer in number. On a more promising note, toy modification is experiencing a tremendous boom. Often a simple modification can be performed on any battery operated toy. (For specifics refer to C. Wethered in Communication Outlook, Vol. 2, No. 2). One possible explanation for the growing popularity of adapted toys is the growing number of children fitted with switches for the purpose of controlling an automated communication aid. These control switches can in fact provide a secondary function when interfaced with a toy. For some children additional skill training is required before they can actually control a communication aid effectively. highly reinforcing and motivating toys allow for enjoyable experiences while training for reliable switch control. In the Communication Enhancement Clinic at the Children's Hospital Medical Center, Boston, for example, switch fitting is initially accomplished by interfacing a child with a toy.

"We recognize the importance of toys for children in that they provide endless hours of entertainment. In addition to enjoyment, toys foster the development of pre-linguistic and cognitive skills, such as attending, motor coordination, sorting, matching and categorization, schemas for causality, object permanence, etc. I emphasize that accessible toys have been particularly unavailable until recently. Toy adaptation has gained popularity for children with cognitive and/or physical limitations. Since federal legislation mandates equal educational opportunities for all children, educational facilities are required to design programs to promote development in all the prelinguistic and cognitive areas just mentioned for which toys are so important. Thus, more widespread availability and utilization of modified toys should ensure more stimulating and challenging learning environments for all children."

Reprinted from: "Communication Outlook", Vol. 3, #1, April 1981

TOY SELECTION

Exceptional Equipment for Exceptional Children

"Good playthings should have these characteristics:

- o free of detail as possible.
- o versatile in use.
- o easily comprehended.
- o large, easily manipulated parts.
- o involve child in play, including large muscles.
- o encourage cooperative play.
- o material that is warm and pleasant to touch.
- o durable.
- o work as intended.
- o safe.
- o generous in proportions and quantity.
- o price based on durability and design.

"The special child needs special equipment, but that is not all. It is the purpose of therapeutic equipment to enable the child as far as possible to participate in normal life and in normal play. This calls for an integrated approach to equipment, providing special equipment to allow the child to play and standard equipment to play with.

"The integration of special and standard equipment is especially important when mainstreaming requires that every child be educated in the least restrictive environment. A swing with interchangeable standard and special seats can be a real asset, or a rocking boat which accepts a special vestibular board which any child would enjoy.

"The possibilities are endless. With a little imagination you can find the perfect combination of special and standard equipment."

from Criteria for Selecting Play Equipment for Early Childhood Education, Rifton Equipment, Rifton, New York.

Choosing the Right Toy

"It is quite an art to choose the right toy at the right level for a handicapped child. Normal children are more accommodating and active in searching out a suitable toy and finding an appropriate way of playing with it.

"Our problem with the handicapped child is not that there are too many toys for them but that there are too few toys of the right sort. The main purpose of this book is to help you choose the right toy for your child. "It is very difficult to achieve a careful match between commercially available toys and your child's present abilities. At this point you will begin to appreciate the need for special toys. One of the features of the toys that we will be describing is that you can adjust their level to suit your child. A simple idea, but as yet, a novel one in the world of toys."

"Making Toys for Handicapped Children"

The Concept of Control

"Toys modified for the handicapped may represent a child's first understanding of cause and effect. The operation of a control interface connected to a toy is an excellent way of introducing control of an object in the environment as well as providing an early, simplistic association with a technical device which may be a forerunner for future, more complex aids. Many electronic and electrical toys can be modified for control by an interface using a battery interface. This device serves as an interface between the batteries of the toy and the control interface."

A listing of appropriate battery-operated toys is available from the Prentke Romich Company, Shreve, Ohio.

Battery interfaces are available commercially from companies such as Prentke Romich and ZYGO, or you can make them yourself (see **D-I-Y**, below).

A Note on Safety

Though disabled children may have some special needs to consider when selecting toys, the need for safety is the same as for any other child.

Easter Seals (2023 W. Ogden Avenue, Chicago IL 60612) distributes Playing It Safe: A Safety Checklist for Children's Toys, reprinted from the Journal of American Insurance, Fall, 1977.

DO-IT-YOURSELF (D-I-Y)

You can make adapted toys; there are instructions in several of the books and pamphlets listed in the publication section. Also see the section on CONTROL, page 201.

Toy Adaptation. Chris Wethered. Canadian Association of Toy Libraries, 50 Quebec Avenue, Suite 1207, Toronto, Ontario M6P 4B4 CANADA. 14 pages. June 1979. Basic information needed to adapt battery-operated toys for activation by disabled children.

Guidelines for Adapting Battery Operated Toys. Revised 1982. Jayne Higgins. The 25 page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch. Toy to in-line jack procedures are also given which permits easy and immediate interchange of different switches to the toy. Step-by-step illustrated instructions are included as well as information on common pitfalls and problems. Information on where to obtain materials and toys through nation wide stores is included (i.e. Sears catalog; Radio Shack catalog). All switches are relatively inexpensive to make ($2.00-$5.00). Available from: California Avenue School, Jayne Higgins, Speech Pathologist, 215 W. California Avenue, Vista, CA 92083. $3.00.

Toy Modification Note: Build It Yourself Battery Interrupter. Gregg Vanderheiden. Trace Center, Madison, Wisconsin.

PEOPLE AND ORGANIZATIONS WITH A SPECIAL INTEREST IN TOYS AND GAMES

Linda Barr, Technical Resource Centre
Alberta Children's Hospital
Child Health Centre
1820 Richmond Road, S.W.
Calgary, Alberta T2T 5C7

Linda J. Burkhart
8315 Potomac Avenue
College Park, MK 20740

Rehabilitation Engineering Center
University of Tennessee
682 Court Avenue
Memphis, TN

Trace Center
University of Wisconsin--Madison
314 Waisman Center
1500 Highland Avenue
Madison, WI 53706

Margrit Beesley
Augmentative Communication Service
Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8

Arselia Ensign, Director
PAM Assistance Centre
110 Marshall Street
Lansing, MI 48912

Howard C. Shane, PhD, Director
Communication Enhancement Clinic
Children's Hospital Medical Center
300 Longwood Avenue
Boston, MA 02115

Peggy Tyler
528 1/2 N. Buckeye
Wooster, OH 44691

Peggy Barker
Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, CA 94304
415/327-4800

Deborah Gilden, Ph.D.
Smith-Kettlewell REC
2232 Webster
San Francisco, CA
Toys for blind children.

Steven Kanor, Ph.D.
10 Lefurgy Avenue
Hastings-on-Hudson, NY 10706

SOME MANUFACTURERS AND DISTRIBUTORS OF SPECIAL TOYS

You can obtain toys from:

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90250

AbleChild
154 Chambers Street
New York, NY 10007
212/255-0068

The Aidis Trust to Aid Disabled & Elderly People
4 Stour Close
Shillingstone, Blandford
Dorset, England

Behavioraids
1210 West Alameda Drive
Tempe, Arizona 85282

Brad's Toys
P.O. Box 12
Prospect Height, IL 60070

Discovery Toys
Paula Fogleman, OTR
3900 Sharp Road
Glenwood, MD 21738
301/442-1833

Education Technology Center
Box 64
Foster, Rhode Island 02825
401/822-4622

Electronic Handicapped Equipment, Ltd.
1165 Portland Avenue
Rochester, NY 14621
716/544-9060

Equipment Shop
P.O. Box 33
Bedford, MA 01730

Exceptional Play, Inc.
P.O. Box 1015
Lawrence, Kansas 66044

G.E. Miller, Inc.
484 S. Broadway
Yonkers, NY 10705

H & H Hagland & Hanses HB
Borganasagen 20
2-781 31
Borlange, Sweden

Handicapped Children's Tech. Services
RFD 2, Box 60B
Foster, Rhode Island 02825

The Handlers
P.O. Box 13178
Tucson, Arizona 85732

Huntercraft
Special Toys for Special Children
Sherborne, Dorset
England
Phone: (093581-2288)

Steven Kanor, PhD
101 Lefurgy Avenue
Hastings-on-Hudson, NY 10706

Mid-Canada Medical
1230 Crestlawn Drive
Mississauga, Ontario
Canada

Kurt Naef
CH-4314
Zeiningen, Switzerland

Prentke-Romich Co.
8769 Township Road 513
Shreve, Ohio 44676

J.A. Preston Corporation
60 Page Road
Clifton, NJ 07012

Rifton Equipment
Rifton, NY 12471

Special Friends
P.O. Box 1262
Lowell, MA 01853

Telegraphics
P.O. Box 1061
Carrollton, Texas 75006

Touch Toys, Inc.
303 Ritchie Highway
Rockville, MD 20852

Toys for Special Children
101 Lefurgy Avenue
Hastings-on-Hudson, NY 10706
914/478-0960

Zygo Industries
P.O. Box 1008
Portland, Oregon 92707

Toys and games for blind children are available from these sources:

American Foundation for the Blind (AFB)
Customer Service Division
15 W. 16th Street
New York, NY 10011

American Printing House for the Blind Incorporated (AMPHBI)
1839 Frankfort Avenue
P.O. Box 6085
Louisville, KY 40206

Science Products (for the Blind) (SFB)
Wayne Box A
Southeastern, PA 19087

TOY LIBRARIES

Children with special needs often do not have the same access to toys as other children. One solution to this problem is to start a Toy Library which makes toys available to children in the same way that regular libraries make books available to people. A toy library provides access to a wide variety of high quality playthings for children, and especially for infants and pre-school children.

Children respond best to novelty and frequent change in their playthings. The variety of various toys required to supply this diversity of play experiences are, unfortunately, beyond the means of most households. What better solution than to have a whole range of developmental toys to borrow?

Some toy libraries, such as The Daisy Toy Lending Library exists as a support service and resource for the handicapped child's parents, his prime teachers. When parents can play with a child in a relaxed fashion, yet still promote the sequence of learning through informed choice and use of toys, the child may progress faster and farther, building up confidence in his own abilities, and have fun in the process. The library is designed to strengthen parental competence in stimulating the developmentally delayed child.

Some toy libraries also have TOYMOBILES, mobile vans that bring the collection to the community.

For more information on toy libraries:

TOY LIBRARIES ASSOCIATION

ARK, a publication of the Toy Libraries Association, is concerned with the establishment and upkeep of toy libraries. The journal lists new toy libraries and contains information on building and buying toys. ARK also contains a section entitled "Activity" which reviews various programs sponsored by local ACTIVE groups throughout the United Kingdom. ACTIVE members develop communication aids, education aids and play aids for both children and adults who experience handicaps.

"Activity" also includes news about groups with subscriptions to ARK, a review of reference books and news of radio and television shows concerning persons who experience handicaps.

For further information, write ARK, The Journal of The Toy Libraries Association, Seabrook House, Wyllyotts Manor, Darkes Lane, Potters Bar, Herts EN6 2HL, ENGLAND.

ACTIVE

The stated aim of ACTIVE, with groups located in Britain, Australia, New Zealand, Canada and throughout Europe, is to help children and adults who experience handicaps to lead more independent lives. ACTIVE is affiliated with the Toy Libraries Association. Membership of TLA/ACTIVE totals 800 persons. These individuals come from a variety of backgrounds, including those who experience handicaps, their friends and relatives, and professionals.

One project pursued by ACTIVE is the publication of worksheets which contain designs for a range of play, leisure and communication aids not available commercially. The designs are submitted by ACTIVE members.

For further information, contact ACTIVE, Seabrook House, Darkes Lane, Potters Bar, Herts EN6 2HL, ENGLAND.

CANADIAN TOY LIBRARIES ASSOCIATION
50 Quebec Ave., Suite 1207
Toronto, Ontario M6P 4B4, Canada

U.S.A. members of Canadian Toy Libraries Association include:

California

Daisy Toy Lending Library
890 Morse Avenue
Sacramento, CA 95608

The Toy Chest
2371 Stanwell Drive
Concord, CA 94520

Connecticut

Click Industries Ltd.
66b Rolling Ridge Road
Stamford, CT 06903

Florida

Tallahassee Toy Library
410 1/2 N. Bronough Street
Tallahassee, Florida

Illinois

Chicago Public Library
Children's Services Spec.
425 N. Michigan
Chicago, Illinois 60611

Children's Services
Champaign P.L. & Info. Ctr.
505 So. Randolph
Champaign, Illinois 61820

Glenview Public Library
1930 Glenview Road
Glenview, Illinois 60025
Attn: M. Kraut

Indiana

Indiana State Library
Serials Section
140 N. Senate Avenue
Indianapolis, Indiana 46204

143

Maryland

Harford County Library
100 Pennsylvania Avenue
Bel Air, Maryland 21214
Attn: M. Jaugstetter

Worcester County Library
307 N. Washington Street
Snow Hill, MD 21863

Michigan

PAM Assistance Centre
601 Maple
Lansing, Michigan 48909

Minnesota

Ms. Janet Cahill
3611 37th Ave. N.E. #209
Minneapolis, MN 55421

Moorhead Public Library
Lake Agassiz Regional Library
P.O. Box 699
Moorhead, MN 56560

Toys 'n Things
906 North Dale
St. Paul, Minnesota 55103

Nebraska

Bellevue Public Library
1003 Lincoln Road
Bellevue, Nebraska 68005

New Jersey

Mrs. Geri Schumann
5 Amherst Place
Upper Montclair, NJ 07043

New York

The Adriel and Evelyn Harris Toy Library
for Handicapped Children
United Cerebral Palsy of Westchester
David G. Osterer Cerebral Palsy Center
King Street & Lincoln Avenue
Town of Rye, NY
(914) 937-3800

Ohio

Mentor Public Library
8215 Mentor Avenue
Mentor, OH 44060

Ms. Helen L. Orringer
2151 Evansdale Avenue
Toledo, OH 43607

Toy Library for Special Children
Cincinnati Center for Developmental
Disabilities
Children's Hospital Medical Center
Cincinnati, OH 45229
513/559-4626

Toys of Love
201 Wick Avenue
Youngstown, Ohio 44503

Oregon

Dr. Caroline Bauer
6535 S.W. Chelsea
Portland, Oregon 97223

Pennsylvania

Pittsburgh Toy Lending Library
5410 Baum Boulevard
Pittsburgh, PA 15232

Wisconsin

Door County Toy Library
c/o Kathy White
833 Michigan
Sturgeon Bay, Wisconsin 54235

Ms. Nancy Elsmo
75 7th Street
Racine, Wisconsin 53403

Mead Public Library
710 Plaza 8
Sheboygan, WI 53081

A directory of toy libraries (not specific to, but including libraries with toys for disabled children) has been published by Toys N Things Press, 906 N. Dale Street, St. Paul, MN 55103, 612/488-7284. Contact Jean Nicol for more information.

Hidden in Play: Lekotek is a documentary film that shows children in Scandinavia and the United States using Lekoteks -- toy libraries for children who experience handicaps. The libraries' trained staff members choose toys for the child's particular developmental needs and help parents guide their child's development through play.

The film follows the real experiences of eight children discovering their local Lekotek. Two centers are features, one in Baerum, Norway, and the other, the first American Lekotek, in Evanston, Illinois.

The 28-minute film won the Blue Ribbon in Child Development Films at the 1982 American Film Festival, a Golden Eagle from CINE, and second place in the Programs and Facilities category at the Sixth International Rehabilitation Film Festival. Distributed by Filmedia Limited, the color film is available in 16mm or videocassette for sale or rental. For further information, contact Filmedia Limited, 1201 W. Chase Avenue, Chicago, IL 60626.

The address for the Lekotek in Evanston is Lekotek, 613 Dempster Street, Evanston, IL 60201, 312/328-0007.

Although it is not a lending library, The Able Child (154 Chambers Street, New York NY 10007) has a wheelchair-accessible play area and professional advisors to select toys and play equipment. TAC is a resource center with aids for all ages. Free catalog.

SELECTED PUBLICATIONS: TOYS AND GAMES

"Adapted Games and Developmental Motor Activities for Children." Michael Marsallo, MA, and Dennis Vacante, MA, 4608 Exeter Street, Annandale, VA 22003. $8.50.

"Adapting Audio/Video Games for Handicapped Learners." Teaching Exceptional Children. Part I: Vol. 14, #2, November 1981. Part II: Vol. 14, #3, December 1981. Single copy available from: Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091. $3.50. The material for these articles is excerpted from Audio/Visual Games for Severely Handicapped Learners: Possibilities and Simple Adaptations by Karen Hughes, produced by the National Media Materials Center for Severely Handicapped Persons. Part II features special adaptive equipment checklists for adaptations that need to be made, suggestions for do-it-yourself projects, and more profiles of toys and games.

"Adapting Toys for Children with Disabilities." The Exceptional Parent. Celia Schoeffler with Sandra Brooks. August, 1982.

"Adaptive Controllers for Video Games and Computers." Ken S. Yankelevitz. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

Choosing Toys and Activities for Handicapped Children. Jill Norris. Toy Libraries Association, Seabrook House, Wyllyotts Manor, Darkes Lane, Potters Bar, Herts, England ENG 2AB. 1974.

"Communication Outlook." Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, Michigan 48824. Communication Outlook is a quarterly newsletter addressed to the community of individuals interested in the application of technology to the needs of persons who experience communication handicaps due to neurological or neuromuscular conditions. Communication Outlook is edited and published jointly by the Artificial Language Laboratory, Michigan State University and the TRACE Center for the Severely Communicatively Handicapped, University of Wisconsin. It is the principal publication of ISAAC. Subscriptions are $10 ($12 outside North America). Subscriptions are for whole volumes (4 issues). Single copies are available for $3.00.

"Instructions for Constructing a Large Area Flap Switch (LAFS) to Allow Disabled Children to Control Battery Operated Toys." G. Fraser Shein. Biofeedback Research Project, Rehabilitation Engineering Department, Ontario Crippled Children's Centre, 350 Rumsey Road, Toronto, Ontario M4G 1R8 Canada. November 1980.

Educational Games for Physically Handicapped Children. Cratty and Breen. Available from: Fred Sammons, Inc., Box 32, Brookfield, IL 60513. Love Publishing Company, 1777 South Bellaire Street, Denver, CO 80222. $4.95. A 90-page booklet of recreational games which involve the larger muscle groups. Games can be played with a minimum of equipment. Activities are grouped in order of difficulty and include learning games. Excellent drawings supplement the text. Extensive bibliography.

The Good Toy Guide. The Toy Library Association, Potter's Bar, Herts, England ENG 2AB. 1980.

Guidelines for Adapting Battery Operated Toys. Revised 1982. Jayne Higgins. The 25 page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch. Toy to in-line jack procedures are also given which permits easy and immediate interchange of different switches to the toy. Step-by-step illustrated instructions are included as well as information on common pitfalls and problems. Information on where to obtain materials and toys through nation wide stores is included (i.e. Sears catalog; Radio Shack catalog). All switches are relatively inexpensive to make ($2.00-$5.00). Available from: California Avenue School, Jayne Higgins, Speech Pathologist, 215 W. California Avenue, Vista, CA 92083. $3.00.

Homemade Innovative Play Equipment for Activities in Physical Education and Recreation for Impaired, Disabled and Handicapped Participants. 1973. Available from Council on Exceptional Children, 1920 Association Drive, Reston, Virginia.

Guide to Mattel Toys for Parents of the Visually Handicapped Child. Write to: Toys for Special Children, Mattel Toys Division of Mattel, 5150 Rosecrans Avenue MS504, Hawthorn, CA 90250.

Hear and Say: Toys for Children with Hearing, Speech and Language Difficulties. Susan Knowles. Noah's Ark Publication. Available from: Toy Libraries Association, Herts, England. 1978.

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, Second edition. Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740. 50 pages. $5.00 plus $1.00 postage and handling. 1982. This book gives simple directions for constructing toys and switches that can be easily operated by severely and profoundly handicapped children. No special skills are needed to make them. All supplies can be found around the house or purchased inexpensively at local stores. One example is a head control switch. The materials cost about $2.50 and takes about half an hour to construct. The switch is attached to the child's head with a barrette and plugged into a toy or tape recorder. When the child lifts his or her head, the music or toy turns on, thus giving the child a reason to lift their head. This book has a wide range of applications and should be useful to parents, teachers, specialists of vision, hearing, speech, physical and occupational therapists and other friends of the handicapped.

Making Toys for Handicapped Children. Roy McCorkey and Dorothy Jeffree. Human Horizons Series, Souvenir Press Ltd., 43 Great Russell Street, London, England. 1981. Provides parent

and teachers with simple instruction on how to make toys especially designed to stimulate the development of mentally and physically handicapped children. Photographs and drawings illustrate the construction of each toy, and accompanying suggestions show how to use each toy for maximum benefit to the child. This is an excellent book on making and using low-cost toys.

Let Me Play. Dorothy Jeffree, Roy McCorkey and Simon Hewson. Souvenir Press, London, England. 1977.

Let's Play Games! National Easter Seal Society for Crippled Children and Adults, 2023 W. Ogden Avenue, Chicago, Illinois 60612.

"Making Toys Accessible." Communication Outlook, Vol. 2, No. 1, September, 1979. Barry Romich, Prentke Romich Company, 8769 Township Road 513, Shreve, Ohio 44676.

Meeting the Needs of the Handicapped: A Resource for Teachers and Librarians. C.H. Thomas and J.L. Thomas, editors. Oryx Press, Phoenix, AZ. 440 pages. 1981.

More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities. Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740. $12.50. 1982. A continuation of the first book. Includes a section on suggested activities for incorporating these devices into the child's program.

No Cost, Low Cost Playthings: Toys for Fun and Learning. Demonstration and Research Center for Early Education, John F. Kennedy Center for Research on Human Development, George Peabody College, Nashville, TN 37203.

PAM Repeater. "Toys-Toys-Toys and Learning." Maurine Otos, State Coordinator of Deaf-Blind Services, Oregon School for the Blind. PAM Repeater is published by the PAM Assistance Centre, 601 Maple, Lansing, Michigan.

Title unknown; "A publication with directions for making simple toys from scrap and recycled items." Touch Toys, Inc., 303 Ritchie Highway, Rockville, MD 20862. $3.00.

Toy Adaptation. Chris Wethered. Available from: Canadian Association of Toy Libraries, 50 Quebec Avenue, Suite 1207, Toronto, Ontario M6P 4B4 Canada. 14 pages. June 1979. Basic information needed to adapt battery-operated toys for activation by disabled children.

Play Helps--Toys and Activities for Handicapped Children. Roma Lear. William Heinemann Medical Books, London, England. 1977.

Prattle and Play: Equipment Recipes for Nonspeech Communication. Faith Carlson. Media Resource Center, Meyer Children's Rehabilitation Institute, 444 South 44th Street, Omaha, NE 68131. $5.00. The book is aimed toward both professionals and parents who are interested in building toys or communication devices for nonverbal children. The book is arranged in "recipe format," like a cookbook, making it suitable for the novice.

The book is divided into two sections. The equipment section includes materials and instructions needed for making equipment. The adaptations section tells how to make special measurements and changes in design for a particular child's needs. The materials used to construct the equipment are principally wood, cloth and plastic.

Toys for the Physically Handicapped Child. Margrit Beesley. Augmentative Communication Service, Ontario, Canada. 1982. Available from: Toys for the Physically Handicapped Child, 53 Fairmeadow Avenue, Willowdale, Ontario M2P 1W8, CANADA.

Toys Help: A Guide To Choosing Toys For Handicapped Children. Canadian Association Toy Libraries, 1207-50 Quebec Avenue, Toronto, Ontario Canada M6P 4B4. $7.00. 1981. Toys Help is a five-part information kit which introduces the therapeutic and educational uses of toys and also offers the basic information needed to set up a toy/play based therapeutic project. The kit contains a rationale and model for conceptually understanding toy-based therapy (unit 1); criteria for selecting potentially beneficial toys (unit 2); a chart listing 100 toys and their uses (unit 3); administrative and practical suggestions for the storage and cataloging of toys, including basic information for starting a toy library (unit 4); and a number of suggestions for modifying commercially available toys (unit 5). Also included are the titles of several books and articles, names and addresses of toy suppliers and agencies or organizations involved with and interested in helping children through the use of toys.

The Use of Current Technology in the Design and Construction of Simple Inexpensive Teacher Made Response-Contingent Educational Materials for the Severely and Profoundly Handicapped Population. Chris E. Wethered. 1978. Master's Thesis, University of Miami. Available from: Chris Wethered, c/o University of Tennessee, Rehabilitation Engineering Center, 1248 La Paloma, Memphis, TN.

"The Value of Toys." Communication Outlook, April 1981, Vol. 3 Number 1. Howard C. Shane, Ph.D., The Children's Hospital Medical Center, Boston, MA.

Wobble Switch Toy Control Switch: A Do It Yourself Guide. Ben Brown. 1980. 3 pages. Available from: TRACE Center, University of Wisconsin, Madison, WI 53705.

PLAYGROUNDS

Access to Play - A Design Criteria for Adaptation of Existing Playground Equipment for Use by Handicapped Children. Contact: Pittsburgh Architects Workshop, Inc., 237 Oakland Avenue, Pittsburgh, PA 15213. 102 pages. 1979. The ideas presented emphasize adaptation of existing equipment to make public playgrounds safer and more accessible for both normal and handicapped children. Dimensions, diagrams, and detailed descriptions are provided, as well as a fine bibliography.

The Design of a Pre-School Therapeutic Playground: An Outdoor Learning Laboratory. Ronnie Gordon. Institute of Rehabilitation Medicine, 400 East 34th Street, New York, NY 10016. 52 pages. 1972. Describes the design and development of an outdoor therapeutic playground area for disabled children in which space, equipment and activity areas are consistent with the education goals of the IRM. The equipment shown has been custom built, but could be adapted using less expensive materials.

An Instructional Playground for the Handicapped Using Tires as Inexpensive Playground Equipment: Activity and Construction Manual. The University of the State of New York, The State Education Department, Division for Handicapped Children, Special Education Instructional Materials Center, 55 Elk Street, Albany, NY 12234. 50 pages. 1975.

Playground for all Children. Book I, User Groups and Site Selection, 52 pp., ($3.30). Book II, Design Competition Program, 49 pp., ($1.60). Book III, Resource Volume, 153 pp., ($3.50). U.S. Department of Housing and Urban Development, Government Printing Office. 245 pp. These three booklets pertain to the construction of public playgrounds designed for integrated play between handicapped and able-bodied children. Booklet I describes the children who are expected to use it and the background research studies for the project. Booklet II deals with the design competition devised for the city of New York to encourage the widest variety of approaches and solutions. Volume III documents the development of the playgrounds and deals with process and product.

Playgrounds For Free: The Utilization of Used and Surplus Materials in Playground Construction. Paul Hogan. MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142. 252 pages. 1974. Shows how to obtain discarded materials, such as tires, telephone poles, and cables, and how to construct playgrounds out of them. The emphasis is on involving community residents in building their own playgrounds.

Technology for Personal Mobility

TECHNOLOGY FOR PERSONAL MOBILITY 135

MOBILITY DEVICES 135

SEATED WHEELED SYSTEMS 135
MOBILITY DEVICE EVALUATION GUIDE 135
WHEELCHAIR CONTROL SYSTEMS 145
BATTERIES FOR WHEELCHAIRS 146
INFORMATION RESOURCES ON WHEELCHAIRS 147
SOME COMMERCIAL SOURCES OF WHEELCHAIRS 149
R&D ORGANIZATIONS 152
WHEELCHAIR STANDARDS 152
MOBILITY -- BEYOND SEATED WHEELED SYSTEMS 153
CHOOSING & USING OTHER TYPES OF MOBILITY EQUIPMENT (WALKING AIDS, LIFTS, ETC.) 153
PROTECTIVE AIDS 153
MOBILITY FOR BLIND PEOPLE 154

SEATING AND POSITIONING TECHNOLOGY 156

INTRODUCTION 156
THE FUNCTION OF A WHEELCHAIR CUSHION 156
PRESSURE RELIEF 157
POSTURAL SEATING 159
A BRIEF GUIDE TO POSTURAL SEATING TECHNOLOGY 159
SEATING SERVICE PROGRAMS 164
COMMERCIAL SOURCES 166
SIDE-BY-SIDE TRIALS 170
PUBLICATIONS 172
BIBLIOGRAPHY 173
AUDIOVISUALS 178

PERSONAL VEHICLES 179

INTRODUCTION 179
HINTS ON OPERATING A SUCCESSFUL DRIVER EDUCATION PROGRAM 179
ASSOCIATION OF DRIVER EDUCATORS FOR THE DISABLED 180
DRIVING EVALUATION FORMS 181
EQUIPMENT RECOMMENDATION FORM 185
CAR SELECTION AND PURCHASE 185
GUIDE TO THE USE HAND CONTROLS AND ASSISTIVE DEVICES 186
OTHER RESOURCES: PUBLICATIONS AND AUDIOVISUALS 187
RESEARCH & DEVELOPMENT 189

MOBILITY DEVICE EVALUATION GUIDE

General

This guide is designed to provide a way to systematically compare different mobility aids or evaluate the appropriateness of a device for a specific mobility device rider. The form does not discuss how to fit a wheelchair but is more concerned with what the device is designed to do and how well it works. The items included have been compiled from criteria used by designers, therapists, and consumers to evaluate assistive equipment.

Rating System

The rating system allows for comparing performance in certain areas such as posture and mobility in a single product or comparing one area in many products in a quantitative manner. The novice may have difficulty rating certain items, such as maintenance or durability, but the form may be used as a guide to obtaining systematic information from experienced users.

The rating system is a sliding scale from 0 to 5. Give a 0 if the item does not function, is most unsatisfactory, or is unacceptable. A score of 5 indicates the item performs very well, is most satisfactory, or is the best. Gradations between the extremes are scored 1, 2, 3, or 4. A category NA is provided for inapplicable functions, e.g. a manual wheelchair has no electrical system to critique.

In general, the comments section should explain why the rating was given, what equipment features or modifications affect the function, or conditions required for the device to work.

The instructions for the rating sheets explain each item and provide suggestions for comments. The user may choose to use or ignore these recommendations. However, the usefulness of the form depends on the quality of the comments made on the form by the evaluator.

This guide was developed by Helen Tsuda, M.A. Candidate, Division of Physical Therapy, Stanford University Medical School, April 1981, with the guidance of Sandi Enders, OTR and Kelly Flanagan, at Children's Hospital at Stanford, Rehabilitation Engineering Center. Special thanks to Sam McFarland, Southwest Research Institute, San Antonio, Texas, for editing assistance and to the Bay Area Pediatric Interest Group for identifying the need for such an evaluation guide.

MOBILITY DEVICE EVALUATION GUIDE REFERENCES

Clearfield, D. Medical Devices and Equipment for the Disabled: An Examination. Disability Rights Center, Washington, D.C. 1976. This paper discussed the safety, cost and consumer satisfaction of medical equipment. A case study of the wheelchair industry mentioned problems seen by users which includes durability, cost, fit, weight, and repairs.

Clinical, Engineering and Work Related Evaluation of Stationary Stand-up Frames and Stand-Up Frames and Stand-Up Wheelchair for the Disabled. Research Project #R-115. New York University Research and Training Center Annual Report, pp. 57-69, 1979-1980. This project examined the La Berne Gearlift Stand-In Table and LEVO Stand-Up Wheelchair in terms of the assistance needed to use, pressure exerted by straps or structures, tolerance, and user reaction. Balance, stability, mobility, and adjustability were also considered.

Enders, S. "Draft Proposal for Wheelchair Evaluation for the Veterans Administration Prosthetic Center, New York." Center for Independent Living, Equipment Evaluation Program, Berkeley. This draft provided a list of characteristics of equipment to be examined. Points often overlooked in other critiques included restraints, transfer access, disengagement of the power source and drive, instructions provided, prescriptive indications, comparison to previous equipment, and how it is secured for transport.

Fenwick, D. Wheelchairs and Their Users. Her Majesty's Stationary Office, London, 1977. The National Health Service interviewed wheelchair users in England and Wales to determine user demographics, disabilities, equipment use, and satisfaction with the equipment and service. The interview questionnaire was included.

Grall, T.B. A Feasibility Study of Product Testing and Reporting for Handicapped Consumers. Consumers Union of the United States Inc., Mount Vernon, NY. March 1979. The study was designed to show the need and marketability of product evaluations for handicapped consumers. Some consumer concerns often overlooked by designers included durability, utility, ease of use, and repairs--cost, part availability, and service agent competence. Rehabilitation professionals also wanted safety information.

Hotchkiss, R. "Left To Your Own Devices: The State of the Art of Wheelchair Design." In Mobility for Spinal Cord Impaired People: Report for a Workshop Held at the Rancho Los Amigos Hospital, Downey, CA, on February 22-24, 1974, pp. 45-59. National Research Council, Washington, DC, 1975. Available from the National Rehabilitation Information Center (NARIC), Catholic University, Washington D.C. This presentation referred to current characteristics of wheelchair designs then discussed advantages and disadvantages of some designs proposed to solve frame, wheel, width, and stair-climbing problems.

Sheredos, S.J., Darlington, J.W., Lyles, M. Evaluation of Stand-Up Wheelchairs. Veterans Administration Prosthetics Center, Clinical Evaluation Service, Castle Point, New York. Undated copy. This article reviewed the design of six wheelchairs with respect to weight, controls, transfers, and user reactions. Pictures of all six chairs in use are included.

Stout, G. "Some Aspects of High Performance Indoor/Outdoor Wheelchairs." Bull. Prosth. Res. BPR-10-32, pp. 135-175, Fall, 1979. This article studied the performance of electric wheelchairs in terms of stability, speed, wheel size, brakes, controls, height, and folding and reclining features.

Team Assessment of Device Effectiveness: A Retrospective Study. Children's Hospital at Stanford, Rehabilitation Engineering Center, Palo Alto, CA, October 1980. This evaluation considered changes in life style, daily use, life span, effectiveness, and cost of devices. Functional, psychosocial and environmental need of the user are stressed. Fifteen aspects of good equipment are also included.

VAPC Evaluations of Mobility Aids Past, Present and Future. Veterans Administration Prosthetics Center, New York, July 1978. Pictures, short descriptions, and findings concerning safety and merits of further examination of some mobility aids are included. No explanations of "standards of acceptability" were given.

Vash, C.L. "Psychosocial and Learning Consideration in using Mobility Systems." Mobility for Spinal Cord Impaired People, pp. 136-145. (See Hotchkiss) National Research Council, Washington, D.C. 1975. This speaker addressed mobility about the home, neighborhood, and beyond. Issues of cost, versatility, cosmesis, safety, and private and public transportation were considered.

DESCRIPTION

DEVICE: _____

Frame: _____

Seat and Back: _____

Wheels, Front: _____

Back: _____

Rims: _____

Brakes: _____

Arm rests: _____

Foot rests: _____

Power system: Motor _____

Battery _____

Charger _____

Controls _____

Other equipment: _____

_____

_____

Dimension: In use: _____

For transport or storage: _____

Weight: Total: _____

Heaviest piece: _____

Cost: _____

Special functions: _____

_____

_____

_____

DESCRIPTION

Introduction

Fill in this form first.

The following suggestions are examples of the variety of styles and helpful information that may be considered in the description of a wheelchair.

This section will contain short phrases to describe important features such as materials used, actions, and whether it is standard or optional. The addition of a photograph is very helpful and highly recommended.

Frame: steel, chrome, plastic, aluminum, wood, paint, folding, non-folding, lightweight, heavyweight, narrow.

Seat and Back: solid seat, sling seat, zippered back, detachable back, vinyl, cloth, contoured, modular, one piece; include type of cushion used.

Arm Rests: part of frame, detachable, adjustable, flared, desk style, full length, padded, skirt guards.

Foot Rests: part of frame, detachable, swing away, elevating, telescoping, wood, metal, plastic, calf pads, heel loops.

Wheels: front or back wheel drive; dimensions (width and diameter); solid, pneumatic, semipneumatic tires, type of tread, free wheeling, casters, spokes.

Rims: chrome, plastic, wrapped, textured, with extensions, type of bracing.

Brakes: Foot or hand control, powered, location, extensions, front or rear.

Motor, Battery, Charger: Battery voltage, number of batteries, variable speeds, covers, plugs and connections, line voltage for charging, charging frequency.

Controls: joy stick, pneumatic, proportional, switches, location.

Other Equipment: list may include straps, pads, head rest, trays, crutch holders, other options.

Dimensions: Height, length, width, or other useful measurements. If the item folds or dismantles for transport, include those measurements.

Weight: Heaviest piece when dismantled should be considered. Even when dismantled, one piece may be too heavy for easy transport or mobility.

Cost: Average cost and a range of costs may be useful or attach catalog and price list. Dating is important since changes occur over time.

Special functions: This space is for listing any special functions or purposes the item may have. Examples: sport model, stand-up, stair climbing.

FUNCTION

DEVICE: _____

	Performance Rating (low high)	Comments
MOBILITY		
Indoors	NA 0 1 2 3 4 5	
Outdoors	NA 0 1 2 3 4 5	
Uneven terrain	NA 0 1 2 3 4 5	
Ramps	NA 0 1 2 3 4 5	
Curbs	NA 0 1 2 3 4 5	
Distance	NA 0 1 2 3 4 5	
Maneuverability	NA 0 1 2 3 4 5	
POSTURAL SUPPORT		
Supports body and its parts	NA 0 1 2 3 4 5	
Maintains posture	NA 0 1 2 3 4 5	
Controls abnormal tone	NA 0 1 2 3 4 5	
Prevents deformities	NA 0 1 2 3 4 5	
Prevents tissue trauma	NA 0 1 2 3 4 5	
Changes position	NA 0 1 2 3 4 5	
DAILY USE		
Comfort	NA 0 1 2 3 4 5	
Ease of use	NA 0 1 2 3 4 5	
Ease of transfers	NA 0 1 2 3 4 5	
Access to tables	NA 0 1 2 3 4 5	
Access to other equipment	NA 0 1 2 3 4 5	
Access to public places	NA 0 1 2 3 4 5	
ADAPTABILITY		
Adjustable parts	NA 0 1 2 3 4 5	
Changing phys. status	NA 0 1 2 3 4 5	
Different disabilities	NA 0 1 2 3 4 5	

MOBILITY DEVICES

MOBILITY

Indoors: The device should be able to negotiate carpets, linoleum, and thresholds. Doorway width may need consideration with special width requirements getting lower scores.

Outdoors: Concrete sidewalks, asphalt road, dirt, and grass are common surfaces that need to be accessible.

Uneven Terrain: Consider uneven sidewalks, thick rugs, sand, gravel, hills, and small obstacles.

Ramps: Limitations to the grade and length of incline should be noted. Energy requirements and the speed of ascent and descent may need attention.

Curbs: Consider the height and assistance necessary to negotiate.

Distance: Any limits and the limiting factor (user, battery, or terrain) should be noted. Example: goes from room to room, works on linoleum only.

POSTURAL SUPPORT

Support Body and Its Parts: Support should be neither inadequate nor too restraining. Indicate whether special pads, straps, or shaping is necessary to achieve sufficient support.

Maintains Posture: The device should not give way under pressure or need constant readjustments.

Control Abnormal Tone/Prevent Deformities/Prevent Tissue Breakdown: Consider whether the equipment inhibits or facilitates abnormal patterns of movement or tone, scoliosis, changes of body position to relieve pressure. Any high pressure areas should have adequate padding to avoid tissue breakdown. (Some aids are designed specifically for these functions while others give postural support secondary importance.)

Changes Position: If a device can change position (e.g., back reclines) consider if support or pressure is altered and describe changes if significant. The amount of assistance required to change should be examined.

DAILY USE

Comfort: This function implies a good fit is possible. The device should not cause pain or discomfort.

Ease of Use: This item must be qualified as to whether the user or an assistant finds the aid simple and smoothly operable.

Ease of Transfer: Again, consider whether the user and/or any assistants find the device easy to get in and out of.

Access to Tables: Tables should be within reach as the chair faces it. Special table height requirements should be noted.

Access to Other Equipment: Other equipment may include kitchen appliances, bathroom fixtures, working area, or assistive devices (e.g., respirator).

Access to Public Places: School, business and recreational facilities should be accessible. Any special needs, e.g., wide electric doors, ramps or assistance should be listed in the comments.

ADAPTABILITY

Adjustable Parts: Parts that can be altered or change position should maintain positions set and change quickly and easily when desired.

Changing Physical Status: The device should accommodate some growth changes or physical and mental deterioration due to disease processes.

Different Disabilities: If the device is extremely specialized for a certain type of patient, give a low score. If the aid can be adapted for many people, score higher.

FUNCTION

DEVICE: _____

	Performance Rating low high	Comments
TRANSPORT		
Into car unassisted	NA 0 1 2 3 4 5	
Into car w/ assistance	NA 0 1 2 3 4 5	
Into van	NA 0 1 2 3 4 5	
Use public transport	NA 0 1 2 3 4 5	
Can be carried upstairs	NA 0 1 2 3 4 5	
Distance	NA 0 1 2 3 4 5	
SAFETY		
Stationary	NA 0 1 2 3 4 5	
In Motion	NA 0 1 2 3 4 5	
Inclement Weather	NA 0 1 2 3 4 5	
Electrical System	NA 0 1 2 3 4 5	
DURABILITY		
Expected lifetime	NA 0 1 2 3 4 5	
Upholstery	NA 0 1 2 3 4 5	
Frame	NA 0 1 2 3 4 5	
Attachments	NA 0 1 2 3 4 5	
Power system	NA 0 1 2 3 4 5	
MAINTENANCE		
Washable	NA 0 1 2 3 4 5	
Repair frequency	NA 0 1 2 3 4 5	
Repair costs	NA 0 1 2 3 4 5	
Downtime	NA 0 1 2 3 4 5	
APPEARANCE	NA 0 1 2 3 4 5	
SPECIAL FEATURES	NA 0 1 2 3 4 5	

Evaluated by: _____

153

MOBILITY DEVICES

TRANSPORT

Into Car Unassisted: Higher score if a user can get the aid in and out with no help quickly and easily. Indicate the smallest car that will accommodate the user and device.

Into Car with Assistance: Indicate how much help is required and car size.

Into Van: Specify special tie-downs to secure device safely for transport and whether the user remains in or gets out of the chair while traveling. The height of the user in the chair may influence the head room required.

Use Public Transportation: Will equipment fit on bus, train, plane, etc.? What special equipment (e.g., lifts) will be needed?

Can Be Carried Upstairs: This item is included for devices which cannot climb or descend stairs or where no ramps or elevators are available. Consider the number of assistants required and whether the user is in or out of seat. (This characteristic may be important for safety in emergencies.)

SAFETY

Stationary: The device should not tip over, rock, or be easily pushed off balance. The brakes should hold well.

In Motion: Progress should be without jerks while going straight or turning. Control must be maintained constantly and easily.

Inclement Weather: Consider safety in wind, rain, snow, ice, heat, cold.

Electrical System: Connections should be good, shock hazards reduced, and charging instructions clear. Watch out for loose wires and battery leaks.

DURABILITY

Expected Lifetime: A list of what component or factor determines the lifetime may be helpful. Example: child outgrows device in six months.

Upholstery: Indicate whether it tears or wears out. Specify if replacements or reinforcements are possible.

Frame: Although rating of this item is mainly concerned with it standing up to daily use, any rattling, bending, or scratching should be examined.

Attachments: Separate pieces should remain firmly attached throughout the life, be replaceable or last as long as the rest of the device.

Power System: Consider which parts last throughout the life, how often batteries need charging and replacement.

MAINTENANCE

Washable: Special cleaning needs should be listed. Rating also includes how often and how easy it is to clean.

Repair Frequency: Least often scores highest. Comments could indicate which parts require most care. (Repairs may also include routine maintenance.)

Repair Costs: The expense will also be affected by who is performing the repair -- user, friend, vendor, bicycle shop, distant manufacturer. Item which requires most repairs or most expensive repairs may be useful to note. Average annual costs may also be informative.

Downtime: This concept includes how long repairs take in which the aid is unavailable, and how often this occurs.

APPEARANCE: This category is one of the most subjective. Consider both the user's and the public's reaction to the device. One guide suggested is to ask "Would I want to be seen using this equipment?"

SPECIAL FEATURES: Space is allowed for listing any significant feature not previously mentioned. Remember to specify what is being rated.

SUMMARY

Device: _____ Date: _____

Put Picture of Aid/Device Here

Brief description: _____

_____

_____

_____

_____

Overall impression: _____

_____

Advantages: _____

_____

Disadvantages: _____

_____

Appropriate users: _____

_____

Availability: _____

Evaluated by: _____

Date: _____ 161

SUMMARY

This section condenses the information obtained from the rating sheets and can be used for quick referencing of important features. A brief description may cover appearance and function of the device, e.g. "battery powered, contour customized wheelchair can mount most curbs." The overall impression should include whether the device works well or not and under what circumstances. The evaluator may find a listing of the device's performance for each broad function on the rating sheets helpful. Specific pleasures or aggravations can be listed under advantages and disadvantages.

The appropriate users section may list the types of disabilities or the functional abilities of people who may use this device. (Example: For users with good upper extremity and trunk strength and control.)

The section for availability allows space for information concerning the manufacturer, vendor, repair facilities, and the time for delivery.

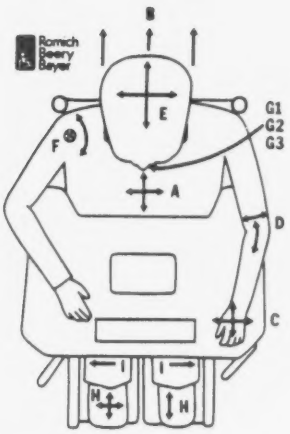
WHEELCHAIR CONTROL SYSTEMS

What Controller Is Best?

Selection of a suitable controller is of major importance in achieving an effective wheelchair control system. Generally, efficient control of the wheelchair represents one of the more difficult tasks to accomplish (both from the standpoint of choice of controller and development of operator skills). Operation of communication aids and typing devices also represent difficult tasks. Most other functions are easily managed by whatever approach works for the wheelchair. Usually, coordinated, simultaneous, two-axis, proportional control (immediate-acting, continuously variable control of both speed and turns), when available, will achieve the best maneuverability. Compromising any of these characteristics will result in decreased precision or a slower rate for a given maneuver.

In order to select or devise the best controller for a given individual, one must weight the various trade-offs. The features generally considered are:

1) The operator's abilities
2) Effectiveness of control
3) Ease of learning and training requirements
4) Appearance (cosmetic and aesthetic)
5) Interference with other desirable functions
6) Medical considerations



What Can Be Used For Control?

By positioning a switch or sensing device at some anatomical location, signals can be derived which might be employed to operate a wheelchair. This listing represents potential control sources; letters refer to the anatomical sites indicated on the drawing.

A. Chin Control: requires very small travel (1/4" or less) to produce proportional control.

B. Head Rest Control: By pushing straight back against the headrest a forward signal is produced. By rocking your head to the left or right against the headrest, turn signals are generated. A separate switch needs to be activated to reverse the sense for backward motion.

C. Joystick: Operates using standard joystick format.

D. Arm/Elbow Control: Movement of the elbow outward and/or sliding of the arm forward and backward might be used for activation of switches or proportional signals.

E. Head Control: Direct use of forward/backward and left/right movement of head is employed.

F. Shoulder Position: Here elevation and depression (or slump) provide forward/backward signals while protraction/retraction of the shoulder provide the left/right signals.

G1. Pneumatic (puff/sip) Control: This system uses hard puffs and sips to control forward and backward velocities, while soft puffs and sips introduce proportional turns.

G2. Spoken Control: A computer can analyze the words you speak and use them in the same way as you might speak to a blind-folded driver.

G3. Mouth, Tongue, Lip Control: A head mounted chin controller element can make use of small movements to provide proportional control.

H. Foot Control: A rocker plate could yield all four signals for wheelchair directions, or "gas pedal" type controls might be used.

I. Knee Control: Thrusting the knee inward or outward can provide control signals.

BATTERIES FOR WHEELCHAIRS

For reasons of energy output and cost per unit weight, the lead-acid battery remains the battery of choice. According to David Bayer, at least 50% of all problems with powered wheelchairs are battery-related. He gives the following "dos and don'ts" of battery choice and care.

The Right Battery

1. If possible, use a rechargeable lead-acid battery designed for deepcycling.

2. Avoid those batteries which are advertised as having these design features:

"Improved cold-start performance" (e.g., DIE-HARD and similarly advertised units).

"Maintenance-free," which generally lack filler caps to permit inspection and replenishing of electrolyte levels.

3. If you must use a gel-cell battery (because of air travel requirements) avoid continuous use on a regular basis. Use a charger designed specifically for the gel-cell.

4. In the instance where deep-cycle batteries are not available, use conventional automobile lead-acid batteries which have filler caps and long warranty periods (2-4 years). Even though it may not be honored, the longer warranty is indicative of larger capacity; i.e., a longer operating period before recharging is necessary, thus avoid deep cycling.

5. If possible, avoid frequent or deep cycling of your battery. Deep cycling occurs when you use most of your battery's capacity before recharging it.

Charging the Battery

1. Do not use automatic (so-called "smart") chargers for conventional auto-style or deep-cycle lead-acid batteries. The "smart" charger approach, though, is recommended in the case of gel-cell batteries.

2. Make a regular habit of recharging your battery nightly.

3. A rechargeable duration in proportion to the amount of driving during the day is appropriate. A charger with a timer shut-off is helpful. Since different chargers will charge at various rates and wheelchairs consume power at differing rates, there is not a specific "charge to use" ratio which can be recommended for all wheelchairs.

4. Approximately once every 1-2 weeks, intentionally overcharge your battery for 6-12 hours beyond the normal charging time. The actual overcharging begins when the ammeter on the battery charger reads one-fourth (1/4) to one-tenth (1/10) of its initial charge rate, i.e., typically one ampere or less. During this time many battery cells will bubble vigorously and emit hydrogen and oxygen. Overcharging should take place in a well-ventilated area. Once the battery is overcharged, immediately fill the electrolyte level up to a little over the plate tops -- using DISTILLED WATER ONLY.

NOTE: Overcharging in a small, unventilated room may pose an explosion hazard.

Battery Connections

1. All battery connection should be inspected monthly and maintained in a corrosion-free state.

2. Clean up all wet spots or spills around the battery as they occur. Wash liberally with water and dry.

3. At least once every 6 months, remove the battery lug clamps and all connections at the battery terminals, thoroughly clean, and reassemble.

NOTE: It is useful to carefully document all connections before disconnecting them.

4. If connection hardware is damaged due to corrosion or physical abuse, replace it.

Batteries -- Handling and Your Health

1. Lead-acid batteries contain sulfuric acid which has damaging effects on metals, cloth, skin, muscle, and fatty tissue. When in contact with skin, it may cause a burning sensation (if sensory nerves are intact). Thus, it should be washed off skin and clothing immediately with liberal amounts of water.

2. After washing liberally with water, then taste (lick) affected skin or cloth surfaces in order to assure yourself of complete removal of the sulfuric acid. Diluted sulfuric acid will have a vinegar taste and is harmless internally.

NOTE: In the event of more than a minor burn, especially in the case of a disabled individual, consult a doctor immediately.

3. Since individuals with spinal cord injuries may not have the benefit of sensation of pain to warn them of acid, take all necessary measures to keep it away from their presence, i.e., skin and clothing.

4. Baking soda is helpful in neutralizing acid in cases where you cannot be assured of washing it away entirely. However, do not use baking soda as a substitute for a thorough initial washing with water.

from "Batteries on Powered Wheelchairs -- The Do's and Don'ts of Battery Care." Reprinted from Current Expressions, Vol. 1., No. 1, 1981, the newsletter of Prentke Romich Company, 8769 Township Road 513, Shreve OH 44676. Mr. Bayer can be contacted at Du-It Controls in Shreve, OH.

SOURCES OF MORE INFORMATION ON WHEELCHAIRS

The most current information about new wheelchair designs and prototypes is generally not in printed sources. Developmental information is exchanged informally through a "people network." Names and addresses of many of these people can be found in the Wheelchair I, II, and III reports. These publications also have information on such things as the history and development of wheelchairs, and the state-of-the-art information on wheelchair design and wheelchair surveys.

Wheelchair I. Report of workshop December 6-8, 1979. Moss Rehabilitation Hospital, 12th Street and Tabor Road, Philadelphia, PA 19141. 1978. 173 pages. Focus on manual wheelchairs.

Wheelchair II. Report of a workshop December 13-16, 1979. Moss Rehabilitation Hospital. 12th Street and Tabor Road, Philadelphia, PA 19141. Focus on powered wheelchairs.

Wheelchair III. Report of a workshop March 25-27, 1982. LaJolla, California. RESNA, 4405 East-West Highway, Bethesda, MD 20814. 67 pages. $10.00. Focus on sports chairs and on specialty adapted wheelchairs.

This selected list focuses on selecting, operating and maintaining a wheelchair.

The Care and Feeding of a Wheelchair. Medical Equipment Distributors, Inc. (MED), 1215 So. Harlem, Forest Park, IL 60130. 1979. 15 pages. Has a section "Diagnosing Your Wheelchair's Ills."

"The Changing Role of Wheelchair Tires." Robert Howard. RxHomeCare, November 1983. Barrington Publications, 825 Barrington Ave., Los Angeles, CA.

Choosing and Using a Wheelchair (Pubn. A-313). National Easter Seal Society, 2023 W. Ogden Ave., Chicago, IL 60612. Single copies free with self-addressed stamped business-sized envelcpe. Quantity rates also available.

Equipment for the Disabled: Wheelchairs (Fifth Edition). Edited by G.M. Cochrane and E.R. Wilshere. Oxfordshire Health Authority. 2 Foredown Drive, Postslade, Brighton, BN4 2BB, England. 1983. 103 pages, figures, photos. L7.50. The book provides worthwhile guidelines on wheelchair selection for anyone anywhere. In focusing on specific brands and listing wheelchair and accessory sources, the book becomes somewhat less useful to those outside of Britain. Lay-out is well done and the pictures/drawings are often helpful.

Functional Wheels. A.G. Garris. Dept. of Rehabilitation, 830 K Street, Sacramento, CA 95814. 1980. 73 pages.

The Professional Wheelchair Contact. Invacare, Inc. Elyria, Ohio. 1980.

A Stitch in Time: Wheelchair Maintenance and Repair. Jere Gandolf Burns. Center for Occupational Curriculum Development, P.O. Box 7218, University of Texas at Austin, Austin, TX 78712. 1982. "No matter how well constructed and how carefully operated the wheelchair is, it still must be maintained or it will break down. This manual tells how to inspect for and recognize problems. It describes routine maintenance procedures, such as inspecting tires. The information can be used to detect problems while they are still small enough for simple repair.

"A Stitch in Time is based on the idea that some simple inspection and maintenance tasks can reduce the number of repairs that must be done on a wheelchair. For that reason, certain chapters have two types of material, called sections. The A section of a chapter covers inspection and maintenance. It tells how to recognize problems, and what to do to correct them and prevent them from getting worse. Section B material is on repair, and tells what to do if conditions have become bad enough to require repair work.

"Most chapters are organized in terms of parts or groups of parts. For example, Chapter 5 is on bearings, and Chapter 6 is on caster wheels.

"In addition, the book has five special-purpose chapters. The first, Chapter 1, Maintenance References, covers information which is necessary for using the other chapters. There are also chapters on fitting the wheelchair, rust, wheelchair safety, and skin maintenance. Special material on motorized wheelchairs is presented in an Appendix at the end of this manual.

"There is no 'typical' person who uses a wheelchair. Therefore, this manual is aimed at a wide group of potential users. This includes people in wheelchairs and their friends and relatives. It also includes people who might enter the occupation of wheelchair repairer. The manual, and audiovisual material related to it, could be useful in a wheelchair repair course. It can also serve as a reference during maintenance. The material has been simply written, so it can be used by people with many different levels of education. It is well illustrated.

"Audiovisual materials have been developed to cover the inspection and maintenance aspects of wheelchair maintenance. The material includes tape cassettes, slide or videotape visuals, an instructor's guide, and a participant's manual. Although the material is for group presentation, it could also be helpful to an individual. In particular, the Participant's Manual summarizes information presented by the A/Vs, and is excellent for review. The A/V material is titled Wheelchair Maintenance -- A Stitch in Time. It is also available from the Center for Occupational Curriculum Development, Division of Continuing Education, Post Office Box 7218, The University of Texas at Austin, Austin, TX 78712."

Street Wheeling Manual. Metropolitan CIL, 1728 University Avenue, St. Paul, MN 55104.

Things to Consider When Buying or Renting a Wheelchair. Pocket Catalog No. 3. Everest & Jennings.

163

Inc., 3233 East Mission Oaks Blvd., Camarillo, California 93010. 805/987-8911. 1976.

Wheelchair Maintenance and Simple Repair. Carol Nordstrom, RPT. Physical Therapy Department, Woodrow Wilson Rehabilitation Center, Fishersville, VA.

Wheelchair Maintenance for the Non-mechanical Consumer. Allied Resources Center for the Handicapped, Inc., Utica, NY. 1980. Consumer-oriented publication with diagrams and descriptions of preventive maintenance and repair procedures for wheelchairs.

"Wheelchair Management: Developing a System for Long Term Care Facilities." The J. Long Term Care Administration, Vol. VIII, #2, June, 1980.

Wheelchair Management Guidelines. C. Epstein. Occupational Therapy Consultants, Inc., 19 South Bridge Street, Somerville, NJ 08876. This 40-page guide provides an overview and methodology for the systematic management of wheelchairs in an institutional setting. The author presents a rationale for developing the system, describes the implementation and presents specific policies and procedures to set the system in place. Forms and coding key are included.

Wheelchair Prescriptions. Everest & Jennings, Inc., East Mission Oaks Blvd., Camarillo, CA 93010. 805/987-8911. 1976. Booklet 1. Measuring the Patient; Booklet 2. Wheelchair Selection; Booklet 3. Safety and Handling; Booklet 4. Care and Service.

Wheelchair Scheduled Maintenance Program. Everest & Jennings, Inc., East Mission Oaks Blvd., Camarillo, CA 93010. 805/987-8911. Provides information on establishing a program for scheduled wheelchair maintenance in an institutional setting.

Wheelchair Selection: More Than Choosing a Chair with Wheels. B. Fahland, 1976. $2.95 from the Sister Kenny Institute, 800 E. 28th Street at Chicago Avenue, Minneapolis, MN 55404.

Wheelchairs and Accessories, An Accent Guide. B. Garee, Ed. Accent Special Publications, Cheever Publishing, Inc., P.O. Box 700, Bloomington, IL 61701. 134 pp. $7.50 (+ $.65 shipping). This guide contains ideas on choosing the best wheelchair; accessories you can add for comfort, safety, convenience, and fun; how to keep your chair in top shape, and where to get the latest product information.

"Wheelchairs: Aids for Participation and Discovery," "Wheelchairs: Guidelines for Selection," The Exceptional Parent, February, 1983, Volume 13, #1, pp. 17-28. This article covers such areas of concern as the selection process, fitting, appearance, posture, bathrooms, transportation, types of chairs, accessories, cost, and maintenance and service.

"Wheelchairs: Selection, Uses, and Maintenance." Georgiana B. Wilson, LPT, and Virginia L. Kerr, OTR. Chapter 8 in Basic Rehabilitation Techniques: A Self-Instructional Guide, second edition. Robert Sine, MD, editor. Aspen Systems Corporation, Rockville, MD. 1981.

A Wheelchair User's Manual for People with Spinal Cord Injury. Bruce Blasch, Mobility Training Project, 1981. Available from the author, Waisman Center, University of Wisconsin-Madison, Madison, WI 53705.

See also: references in **Mobility Device Evaluation Guide**, and **Sports Wheelchairs, SPORTS**.

AUDIOVISUALS

I've Got Wheels. Brian Line and Nick Dance. Available from Dance/Line Films, LeCourt, Liss, Hampshire, England. 3/4" videocassette, color, 20 minutes. 1979. Illustrates how correct equipment and environment can provide access to a wheelchair-bound person.

A New Freedom. Amigo Sales, Inc., 6693 Dixie Highway, Bridgeport, MI 48722. 16 mm color, 10-1/2 minutes. 1979. Demonstrates how the AMIGO wheelchair is helping several individuals overcome their physical disabilities.

Power Wheelchairs: When, How, Why. Suzanne Elaine Bennethum, OTR, Dorothy Pezenik, OTR, Charlene Butler, Ed.D., and Susan Harris, RPT, PhD. Everest & Jennings, 3233 East Mission Oaks Blvd., Camarillo, CA 93010, 805/987-8911. 1984. Call your Everest & Jennings representative for a free screening at your facility. Facility screenings include information booklets.

SOME COMMERCIAL SOURCES OF WHEELCHAIRS

See Toll Free Numbers for phone numbers.

MANUAL WHEELCHAIRS

A-Bec
20803 Higgins Court
Torrance, CA 90501
800/421-2269
800/262-1331 (in California)

Accumec Corporation
32 Race Street
San Jose, CA 95126

Bair Chair
#6 Seco Court
Sacramento, CA 95823

Carters Rehabilitation Division
Rajowalt Company
Atwood, IN 46502

Colson Equipment
Harry S. Truman Blvd.
Caruthersville, MO 63830

Convaid
P.O. Box 2731
Palos Verdes, CA 90274

Electrolurgy, Inc.
1121 Duryea Avenue
Irvine, CA 92714

Equalizer
274 Buchon St.
San Luis Obispo, CA 93401

Everest & Jennings, Inc.
3233 East Mission Oaks Blvd.
Camarillo, CA 93010

Gendron, Inc.
Lugbill Road
Archbold, Ohio 43502
419/445-6060
800/537-2521

Hall's Wheels
15 Marlboro Street
Belmont, MA 02178

Imex Riser Wheelchair
5672 Almaden Expressway
San Jose, CA 95118
408/978-8112

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Jung Products
5801 Mariemont Avenue
Cincinnati, OH 45227

Mastercraft Metal Products
P.O. Box 591
Santa Cruz, CA 95061

Mobilizer Medical Products Inc.
500 Nuber Avenue
Mount Vernon, NY 10550

Modern Tubular Production, Inc.
188 High Street
Egham, Surrey, England

Motion Designs, Inc.
1075 Cole
Clovis, CA 93612

Newton Aids (England)
U.S. Distributor:
Newton, USA
469 Ridge Road W.
Rochester, NY 14615

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Orthopedia GMBH (Germany)
U.S. Distributor:
Internat'l. Med. Equip. Corp.
11000 Rush Street, #20
South El Monte, CA 91733

Ortop Tech. Medical Aids (Israel)
U.S. Distributor:
Meditech
544 10th Street
Palisades Park, NJ 07650
201/974-0500

Pin Dot Products
P.O. Box 642
Northbrook, IL 60062

Poirier Wheelchair (France)
U.S. Distributor:
Magnum International
2930 West Central
Santa Ana, CA 92704
714/641-9696

Production Research Corp.
10217 Southard Drive
Beltsville, MD 20705

Quadra Wheelchair, Inc.
31125 Via Colinas #903
Westlake Village, CA 91361

Sears and Roebuck Co.
1633 Broadway
New York, NY 10019

Smith & Davis
1180 Central Industrial Lane
St. Louis, MO 63110
314/771-7145
800/325-7145, 800/238-6678

Stainless Medical Products
9386 Dowdy Drive
San Diego, CA 92126

Summit Services, Inc.
535 Division Street
Campbell, CA 95008

Theradyne Corporation
21730 Hanover Street
Lakeville, MN 55044
612/469-4404
800/323-4014

Vessa
Paper Mill Lane
Alton, Hampshire GU34 2PY
ENGLAND

X-L Enterprises
2003 Palm Avenue
Chico, CA 95926

Zimmer Orthopaedic Ltd.
Bridgend, Mid Glam CF31 3PY
Great Britain

POWERED WHEELCHAIRS

A-BEC
20460 Gramercy Place
Torrance, CA 90501
800/421-2269
800/262-1331 (in California)

Colson Equipment
Harry S. Truman Blvd
Caruthersville, MO 63830

Everest & Jennings, Inc.
3233 E. Mission Oak Blvd.
Camarillo, CA 93010

Everest & Jennings, Inc.
111 Snidercroft Road
Concord, Ontario M4T 2W1
CANADA
416/661-2000

Fortress Scientific
2110 C Northwest Parkway
Marietta, GA 30067
404/952-2792

Instrument Components
759 B Lakeshore Blvd.
Painesville, OH 44077

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Mobility Engineering & Dev.
7131 Hayvenhurst Avenue
Van Nuys, CA 91406

Mobility Plus (L. Mulholland)
P.O. Box 391
215 N. 12th Street
Santa Paula, CA 93060
805/525-7165
800/325-7397

National Welded Products
2900 Spring Street, #6
Redwood City, CA 94063

Newton Aids (England)
U.S. Distributor
Newton USA
469 Ridge Road
Rochester, NY 14615

Orthopedia GMBH (Germany)
U.S. Distributor
Internat'l. Med. Equip. Corp.
11000 Rush Street, #20
South El Monte, CA 91733

Poirier Wheelchair (France)
U.S. Distributor
Magnum International
2930 West Central
Santa Ana, CA 92704
714/641-9696

Saab-Scania of America, Inc.
Saab Drive, P.O. Box 697
Orange, CT 06477
Attn: Permobil

Sears & Roebuck Co.
1633 Broadway
New York, NY 10019

Steven Motor Chair Co.
120 N. Gunter
Siloam Springs, AZ 72761

Summit Services, Inc.
535 Division Street
Campbell, CA 95008

Tunkers Industries, Inc.
1832 Star-Batt Drive
Rochester, MI 48063
313/852-5331

21st Century Scientific Inc.
7135 Hayvenhurst Avenue
Van Nuys, CA 91406

Vessa
Paper Mill Lane
Alton, Hampshire
GU34 2PY ENGLAND

POWER UNITS FOR WHEELCHAIRS

A-BEC
20803 Higgins Court
Torrance, CA 90501

DAMACO
9612 Lurine Avenue
Unit A
Chatsworth, CA 91311

Instrument Components
959 B Lakeshore Blvd.
Painesville, OH 44077

Oxford Orthopaedic Engineering Ctr.
Nuffield Orthopaedic Center
Headington, Oxford, England OX3 7L1

Rosenthal Manufacturing
5033 North Kedzie
Chicago, IL 60625

Mobility Plus (Solo Products)
P.O. Box 391
215 N. 12th Street
Santa Paula, CA 93060
805/525-7165
800/325-7397

Solo Products
2435 Front Street
West Sacramento, CA 95691

21st Century Scientific Inc.
6920 Hayvenhurst Avenue #205
Van Nuys, CA 91406

Zimmer Orthopaedic Ltd.
Bridgend, Mid Glam
CF31 3PY
Great Britain

POWERED WHEELCHAIR ALTERNATIVES

A-BEC
1815 W. 205th Street
Suite 206
Torrance, CA 90501

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90250

Alpha Unlimited, Inc.
2315 Industrial Blvd.
Sarasota, FL 33580
813/351-3488
800/237-6836

American Stair Glide
4001 E. 13th Street
Grandview, MO 64030

Amigo Sales, Inc.
6693 Dixie Highway
Bridgeport, MI 48722

Braun Corporation
1014 S. Monticello
Winamac, IN 46696
219/946-6157
or
5751 Engineer Drive
Huntington Beach, CA 92649

E.F. Brewer Company
P.O. Box 159
Menominee Falls, WI 53051

Chair Lift of California
31220 La Baya Drive, Suite #113
Westlake Village, CA 91362

Electric Mobility Corporation
591 Mantua Blvd.
Sewell, NJ 08080
800/257-7955
800/232-6550 (in New Jersey)

Everest & Jennings, Inc.
3233 E. Mission Oak Blvd.
Camarillo, CA 93010

Independence Chair Company
W220 N507 Springdale Road
P.O. Box 436
Waukesha, WI 53187
414/542-6060

Instrument Components Co.
7239 Industrial Park
Mentor, OH 44060

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Kimed Industries
11 Broadway
New York, NY 10004

Leisure Lift Chairs
P.O. Box 6176
Kansas City, KS 66106

Midon Engineered Products
P.O. Box 1031
Kitchener, Ontario N2G 4E3

Motovator
1722 Border Avenue
Torrance, CA 90501

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8
CANADA

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Palmer Industries
P.O. Box 707, Union Station
Endicott, NY 13760

Sherry Products, Inc.
1501 Pacific Coast Highway
Hermosa Beach, CA 90254

Small Electric Vehicles, Inc.
56 E. Walnut Street
Westerville, OH 43081

C.F. Struck Corp.
W51 N545 Struck Lane, Box 307
Cedarburg, WI 53012

Voyager Ltd.
P.O. Box 1577
S. Bend, IN 46634

Zimmer Orthopaedic Ltd.
Bridgend, Mid Glam
CF31 3PY
Great Britain

See also **SEATING Commercial Sources for Postural Seating Systems**

RESEARCH & DEVELOPMENT ORGANIZATIONS

NIHR-supported research:

University of Virginia Medical Center
Department of Orthopedics and Rehabilitation
P.O. Box 109/UVA
Charlottesville, CA 22908
804/977-6730
Colin McLaurin, Ph.D., Warren Stamp, MD, project directors

Veteran's Administration-supported research:

Rehabilitation R&D
Mail Stop 153
Veterans Administration Medical Center
3801 Miranda
Palo Alto, CA
415/493-5000, x 5465
Larry Leifer, Ph.D., project director

THE DEVELOPMENT OF WHEELCHAIR STANDARDS

A recent development in the rehabilitation engineering field has been a concerted effort to develop voluntary standards for manual and powered wheelchairs. This development has occurred in response to several factors, including international cooperation on the development of wheelchair standards, U.S. government interest in the development of domestic standards, and consumer advocacy for the development of such standards.

RESNA currently serves as the official U.S. representative to the International Standards Organization's (ISO) Wheelchair Standards Subcommittee. The RESNA Subcommittee is also developing voluntary U.S. standards for wheelchairs in cooperation with the Veterans Administration and the Food and Drug Administration.

The RESNA Subcommittee has established an ambitious work schedule for itself and is anticipating the completion of voluntary domestic standards for both manual and powered chairs by the close of 1986.

For more information, see "The Development of Wheelchair Standards," by L.R. Phillips, P.W. Axelson, D.A. Hobson, and S.R. McFarland, in Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, California, June, 1983. Published by RESNA, Suite 402, 4405 East-West Highway, Bethesda, Maryland 20814.

MOBILITY BEYOND SEATED WHEELED SYSTEMS

CHOOSING & USING OTHER TYPES OF MOBILITY EQUIPMENT

There are many publications that include information on walking aids. These are included because they are so clear visually and I like pictures. If you have favorites, please send information to the Sourcebook editor for inclusion in the next edition. (editor)

Basic Rehabilitation Techniques: A Self-Instructional Guide Robert D. Sine et al., editors. Aspen Systems Corporation, 1600 Research Blvd., Rockville, MD 20850. 1981. 268 pages. $20.95. This book was written for nurses who work with disabled persons. Its goal is to provide the nurse with the basic rehabilitation techniques to enable him/her to train disabled people in ordinary functional activities. This includes self-care activities, mobility, pressure relief, pain, etc. The techniques described are simple and utilize equipment that is readily available. The text is written in clear language. Excellent drawings and pictures add to comprehension of details of the technique. Because the techniques include training in the use of assistive devices, this book is also useful to more than just nurses as an introductory guide to the equipment most commonly used by the disabled. It discusses selection, use and training with the devices.

Physical Management for the Quadriplegic Patient J. Ford and B. Duckworth. F.A. Davis Company, Philadelphia, PA. (Out of print; look for it in an OT or PT dept., or a rehab dept.) 1974. $16.95. This textbook on the physical management of quadriplegic patients includes an appendix which describes do-it-yourself aids for these individuals.

Providing Early Mobility Intermed Communications, Inc., 132 Welsh Road, Horsham, PA 19044. 1980. This book is part of a series of training manuals for nurses. This one is written to assist the nurse in taking a positive approach to the emotional and physical considerations in early mobility. It is included in this technology guide because it includes the detailed instruction needed to use the following pieces of transfer and positioning equipment: cradle boots, hand rolls, footboards, hand splints, transfer boards, and mechanical lifters. In other sections of the book, concise captions and how-to-do-it photos show you how to safely transfer a patient with halo traction; how to select the proper crutches, cane, walker or wheelchair for your patient; and how to teach him to use the equipment correctly. It also includes step-by-step procedures and photos for turning and positioning, range-of-motion and isometric exercises, and transfer techniques. This is an excellent training manual for anyone, for instance, a disabled person could use it to train a personal care attendant. The photos are so explanatory, the text is almost unnecessary.

PROTECTIVE AIDS

Assistive and Protective Devices for the Handicapped M.J. Martin (editor). Georgia Retardation Center, 4770 North Peachtree Road, NE, Atlanta GA 30338. July 1981. This manual provides practical information on a selection of adaptive and protective devices such as helmets, eye protectors, mitts, protective gloves, elbow restraints, pelvic supports, etc.

A Resource Guide to Protective Aids J. Frank, K. Mallik, W. Chiu, and Lowry. Job Development Laboratory, The George Washington University, 2300 Eye Street NW, Suite 420, Washington, DC 20037. Protective aids are listed according to the part of the body to be protected and the type of protection required. Includes helmets, restraints and supports, slings and splints, pressure relief and skin protection. Lists manufacturers and suppliers.

MOBILITY AIDS FOR THE BLIND

John A. Brabyn, Ph.D.
Smith-Kettlewell Institute of Visual Sciences
San Francisco, California

"In the application of technology to aid the blind, one of the problems receiving a great deal of attention is mobility -- the ability to move safely and independently through the environment. The technology to assist blind individuals with solving mobility difficulties has been applied only recently, and efforts in this application of technology are still in their infancy.

Historical Overview

"Although sticks of various shapes and sizes probably have been used by blind people for a long time, specific mobility aids for the blind are relatively new. The large number of blind veterans in the United States after World War II prompted Dr. Richard Hoover to begin his classic studies within the Veterans Administration in the systematic use of a long, white cane to aid mobility. The techniques which he developed and refined have been adopted widely in mobility training programs around the world, and can, in the hands of a competent user, transform a simple, white stick into a remarkably effective tool. Indeed, the white cane is currently the most popular mobility aid.

"Another traditional mobility aid is the guide dog. However, guide dogs are used by only a small fraction of the blind community. This situation is unlikely to change for many reasons, primarily because of the substantial cost of training the dog and the limited number of individuals suited to co-existence with a guide dog.

"World War II also prompted the development of radar and sonar technologies for remote sensing. In the 1950s and '60s, transistor technology made electronic devices more portable. Inventors began to see the potential for various obstacle-detection devices to aid blind people. Many devices have been developed, although only a fraction have found their way into practical use. The principal behind most of these obstacle-detection devices is simply the transmission of an energy wave (usually ultrasonic, but sometimes optical) and the reception of echoes from objects in or near the traveler's path. Once received, the signals must be decoded and displayed in some intelligible form, usually aurally or tactilely. Range usually is estimated by measuring the time taken for the wave to reach the target and return to the receiver.

"The maximum range of interest for sensing devices is usually no more than 20 feet, making the use of radar or light waves highly inconvenient and expensive since it involves measurement of extremely short time delays. Optical transmission has been used, however, where range measurement was not a design goal.

"The question of how much information should be presented to the user of a mobility aid and how that information should be displayed is probably the principal issue in mobility and design. Development has followed two schools of thought. One class of aids, known as obstacle detectors or clear-path indicators, warn only of the presence of and sometimes the approximate range of obstacles directly in the travel path, while generally not being concerned with identification of the obstacles detected. Such devices are relatively inexpensive and technically simple.

"A second category of aids, known as environmental sensors, attempts more than mere detection of obstacles.

"The dispute between proponents of obstacle detectors and environmental sensors -- between rich and sparse displays -- is still unresolved. More complex displays require more learning, and too much information can be confusing. There is no doubt that experienced users, however, benefit greatly from the extra input.

Current Status: Problems

"Most of the aids described [in the full text of the paper. ed.] are commercially available, but have not achieved broad penetration of the market. All are relatively expensive, costing anywhere from $300 to $3,000. Most are designed to supplement, rather than replace, the long cane, and there is disagreement over whether the additional information they provide is worth the very considerable extra cost and the effort of training. A skilled user of the long cane can use the sounds emitted by the cane tip for natural echolocation, providing him with a surprising amount of information about the immediate environment. This category of user, although not typical of the general population, would require substantial additional input from an electronic aid before its use became worthwhile. The sophisticated auditory display of such an aid may tend, however, to mask the subtle echolocation cues mentioned above. For those individuals who do not possess refined echolocation skills, however, this argument cannot be valid. Other reasons must be sought for the apparent lack of general acceptance of the existing electronic mobility aids.

"Mobility and navigation is so commonplace to sighted people that it has warranted very little study. As a result, researchers have little basic knowledge to use as a starting point when designing and evaluating mobility aids for the blind. What are the essential components of information needed for mobility? What spatial cues does a sighted person rely on for maintaining a safe course through the environment? Once these cues are identified, how can they best be coded and displayed to the user? If we do not really understand mobility, how can we measure it to ascertain whether an artificial aid is actually improving a blind individual's performance? Until now, the production of hardware has tended to precede and outstrip any progress in the basic knowledge of human goal-oriented locomotion. This

lack of knowledge has begun to be addressed, and more basic research now underway into the problems of orientation and mobility should yield a more satisfactory theoretical basis for engineering design decisions.

Discussion

"None of the electronic travel aids developed so far has seriously challenged the supremacy of the long cane. There is little doubt, however, that such aids can be a valuable addition to a blind traveler's available tools, especially for travel in unfamiliar areas. If the true goals of mobility include traveling with "grace and independence," then clearly the long cane is insufficient. Whether using a long cane is graceful or not of course is debatable, but in practice it acts as a path clearer, causing other pedestrians to step out of the way. This is not independent travel, nor can independence be achieved while it is still necessary for the blind individual to ask questions of passersby on virtually every aspect of way-finding in unfamiliar areas.

"The need for aids which can give advance warning of obstacles and/or additional information about the immediate environment, not to mention assistance in global navigation, appears self-evident. The upcoming generation of mobility aids offers the possibility of achieving some of these goals at lower cost and greater convenience than possible before. Serious efforts are being made to improve upon past designs, while advances in knowledge of the mobility process are strengthening the framework within which these new devices can be evaluated and refined. There are good reasons for expecting steady improvements in technologically assisted travel for the blind."

Excerpted from "New Developments in Mobility and Orientation Aids for the Blind," IEEE Transactions on Biomedical Engineering, vol. BME-29, no. 4, April 1982. Reprinted with permission of the author.

SOME SOURCES OF INFORMATION

Foundations of Orientation and Mobility. Richard L. Welsh and Bruce B. Blasch, Editors. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. 1980. Chapter 11, "Mobility Devices," by Lee Farmer, is of particular interest.

Orientation Mobility Techniques: A Guide for the Practitioner. Everet Hill and Purvis Ponder. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011.

SEATING AND POSITIONING TECHNOLOGY

INTRODUCTION

Clinical application and research on seating technology is generally divided into two major areas: postural control and pressure relief. The bulk of the information on postural control relates to children with cerebral palsy, while the pressure relief field tends to focus on adults who have sustained a spinal cord injury. Much of what is written in both areas is much more broadly applicable, to wider age ranges and to other disability categories. If you are looking for information on seating, you may want to look beyond the "intended audience" label of the publication or product.

Many conferences and workshops held in recent years have demonstrated that seating, whether for pressure relief or for postural control, is not only an area of major concern but one of tremendous controversy. Everyone seems to have their own opinions about what works and what doesn't. Although there is a considerable body of research literature, very little exists in writing on useful clinical approaches and applications.

Paul Brand writes in the Journal of Rehabilitation R&D, July 1983, that:

"A major defect in the whole system whereby research projects are funded and articles are accepted for publication is that too many scientists are looking at Objectives and not enough at Goals.

The result, in major problems like pressure sores, is that the mass of knowledge about pressure on tissue grows and grows, and the actual management of the problem is almost unaffected, or may be getting worse, nationwide...

"Because of the multitude of uncontrollable variables in the life of a series of hospital patients, and because of the larger variety of variables in the home environment, most clinical scientists shy away from any attempt to evaluate total programs. They know they will be dissatisfied with the objectivity and validity of their findings -- and they know they will be torn to pieces by pure scientists and reviewers.

"... we need to look straight at the goal of prevention of pressure sores, and recognize that some of the most important objectives on the critical path towards that goal have escaped serious study because of the difficulty of analyzing the whole life of whole people in terms that fit the requirement of basic scientific research."

> Paul W. Brand, F.R.C.S.
> in Journal of Rehabilitation R&D, Vol. 20, No. 1, 1983, page 73

It takes a certain amount of courage for a clinician to disseminate information about his/her approaches to seating. Nonetheless, publications of clinical usefulness are beginning to appear. They will be noted in this section.

A bibliography of publications focused on postural seating is included in this section; for bibliographic references on pressure relief, see the bibliographies in Zacherow's book Wheelchair Posture and Pressure Sores, in Krouskop's paper in the Journal of R&D, and in Jay's new book, Choosing the Best Wheelchair Cushion.

THE FUNCTION OF A WHEELCHAIR CUSHION

"Most of the research into wheelchair cushions has been done with those people most at risk to pressure sores, such as paraplegics and quadriplegics, but they are minority users of wheelchairs. An English study found that 63% of wheelchair users were divided almost equally into people with osteoarthritis, rheumatoid arthritis, hemiplegia and multiple sclerosis (including those with closely related conditions). Among the remaining 37% only 6% were paraplegic or quadraplegic. Although one of the important functions of a wheelchair cushion is the prevention of pressure sores, there are other functions which, for some people, are more relevant. In our survey we asked people why they had been given wheelchair cushions. Forty-four percent replied that this was to make sitting more comfortable. Twenty-two percent said that it was to reduce the likelihood of tissue damage and the resultant pressure sores. Occasionally, and quite wrongly, a cushion was prescribed to compensate for a wheelchair which was the wrong size for the individual.

"Ferguson-Pell has written that: 'The primary function of a wheelchair cushion is to provide an effective platform from which the patient may operate.' It is remarkably difficult for a patient to work at a table or bench, or for him to propel a wheelchair, if the sling seat normally supplied is his only support. In addition to providing a stable seat, the wheelchair cushion improves comfort, aids posture and reduces the transmission of shock during propulsion over uneven surfaces. Wheelchair cushions are also provided to aid the patient when transferring to other support surfaces, and, for a relatively small proportion of wheelchair users, the wheelchair cushion provides a vital function by reducing local concentration of stress in tissues to prevent tissue ulceration.'

"Not all these functions apply to every wheelchair user and not all cushions fulfill every function. Nevertheless, a sling seat would not normally be chosen for prolonged sitting. It is probable that if all patients were properly assessed, cushions would be automatically prescribed with most wheelchairs -- unless there were definite contra-indications.

"People who sit for long periods of time may use wheelchair cushions on other seats. Elderly people who spend much of the day in an armchair may benefit from a wheelchair cushion, both to add to their comfort and to prevent tissue damage. Cushions are used by people with gynecological problems, prostate gland problems, post-hemorrhoidectomies and other lesions of this area, particularly during travel and in recreational

They are used by people who are unduly sensitive to pressure in the region of the sciatic nerve and by people who are underweight or have gluteal muscle wasting who find sitting without a suitable cushion too uncomfortable. They are also used by hemophiliacs to reduce the likelihood of trauma."

from Choosing the Best Wheelchair Cushion for your needs, your chair, and your lifestyle. Peggy Jay, Dip.COT,SROT. The Royal Association for Disability and Rehabilitaton, 25 Mortimer Street, London W1N 8AB. Revised edition, 1984. Also available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814, 301/657-4142.

PRESSURE RELIEF

"At home or work, prevention of pressure sores and treatment of the early stages of pressure-induced tissue damage are extremely difficult for even conscientious patients. Our understanding of the sore's etiology is not complete and what understanding does exist has not been transferred widely to practical solutions that accomodate daily activity patterns. Similarly, technological aids that effectively reduce an individual's risk of developing a sore are not widely disseminated and utilized."

"...Pressure sores are a severe and potentially life-threatening complication for many individuals with physical disabilities. In 1968 the Veterans Administration estimated that 50 percent of all quadriplegic veterans will require hospitalization because of pressure-related problems during their lifetime and more than 30 percent of the paraplegic population will have a similar fate. It was also estimated by the VA that approximately one-fourth of these persons will die as a direct consequence of pressure sores. The magnitude of the problem is further emphasized when an analysis similar to those done by Robinson in Canada, Noble in Australia, and Motloch in California is performed on the problem in the U.S. Using the assumptions and data from these analyses, the medical costs associated with curing pressure sores in the U.S.A. are estimated to exceed $2,000,000,000 per year. This estimate is consistent with the information presented in the Technology Section of the NIHR long range plan 1981-1986, which emphasized that the effects of pressure on tissue is a high priority area for research and demonstration activities.

"The social costs associated with pressure sores are even greater than the medical costs. These costs include: (1) time lost from a productive vocation with its attendant economic impact on individual and family, (2) time lost from school, which has far-reaching and long-term impact because the disabled person's vocational potential is limited, which generates long-term dependency, (3) loss of time from the family which can have a significant psychological impact on the person's social development, and (4) loss of general personal independence and productivity that ultimately contributes to a serious loss of self-esteem and self-worth.

"The most commonly cited causes of pressure sores included:

1. Prolonged sitting during daily activities, activities such as card playing and video games.

2. Use of old deteriorated wheelchair cushions.

3. Activities that involve sitting on uncushioned areas such as a bathtub, or sitting on a floor to play with young members of the family.

4. Falls while transferring from a wheelchair or bed.

5. Sitting too soon after a surgical procedure to correct a vertebral defect, or even during the comprehensive rehabilitation process.

6. Excessive sweating or irregular attention to skin condition.

7. Wearing clothing that has exaggerated seamlines (such as jeans), which can cause pressure to concentrate on areas that would normally not carry significant loads."

This article goes on to elaborate on a clinical program at TIRR, Houston, and to discuss the history of pressure management research.

Excerpted from the introduction of "The Effectiveness of Preventive Management in Reducing the Occurrence of Pressure Sores", in Journal of Rehabilitation R&D, Vol. 20, No. 1, July 1983, pp. 74-83, by Thomas A. Krouskop, P.E., Ph.D., Philip C. Noble, M.S., Susan L. Garber, O.T.R., and William A. Spencer, M.D., at The Institute for Rehabilitation and Research in the Texas Medical Center, 1333 Moursund Avenue, Houston, Texas 77030.

Available from:
Government Printing Office
Washington, DC 20402
Stock Number 051-000-00161-3

For Commercial Sources of Cushions, contact the ABLEDATA system, which currently lists over 170 different types of wheelchair cushions.

SOME NEW PUBLICATIONS

Choosing the Best Wheelchair Cushion for your needs, your chair and your lifestyle. Peggy Jay. The Royal Association for Disability and Rehabilitation (RADAR), 25 Mortimer Street, London W1N 8AB, England. 203 pages. L5. 1984.

"Peggy Jay, a British occupational therapist, has written an excellent book which brings some sense of organization to the information currently available in the wheelchair cushion area. The book was prepared as part of the Aids Assessment Programme which the English government finances in order to assess a range of aids in a practical way, as distinguished from the more scientific evaluation necessary when undertaking a research project.

Information about wheelchair cushions was compiled from four different sources.

1. Experts in this field, including bioengineers, therapists and doctors, were asked for information about wheelchair cushioning.

2. Suppliers of cushions were invited to the hospital to demonstrate their cushions.

3. Gel, water, air and the more complicated foam cushions were purchased and tried out by a variety of wheelchair users.

4. A field study covering 45 people provided more information about cushion useage and spanned a longer cushion life than was possible on a cushion trial.

"This book does have some minor drawbacks for North American readers. Since she is writing from a British perspective, price and availability information refer to British prices and British suppliers. However, with the information that is provided about each cushion, however -- dimensions, composition, advantages and disadvantages -- a North American reader would have little difficulty in locating a particular cushion. Even relatively recent additions to the marketplace such as the VASIO-PARA cushion and the low profile Roho are included in this volume.

The Prevention of Pressure Sores in Persons with Spinal Cord Injuries. Philip C. Noble. Monograph No. 11. Available from: World Rehabilitation Fund, Inc., International Exchange of Information in Rehabilitation Program, 400 East 34th Street, New York, NY 10016.

Although the subject of pressure sores has been well canvassed in the nursing and rehabilitation literature, in terms of techniques for management and resolution of established ulceration, the theme of pressure sore prevention has generally been neglected. This is particularly true in the case of the independent "rehabilitated" paraplegic or quadriplegic for whom pressure sores are a constant threat to continued independence in the home, workplace, and on the sports field. This monograph explains, with a practical inclination, the magnitude of the "pressure sore problems," the scientific basis of this form of skin ulceration, and, in considerable detail, practical measures which may be undertaken by rehabilitation workers and disabled individuals to reduce the risk of this complication to an absolute minimum. The monograph concludes with an analysis of the clinical results of the prevention program advocated, drawing from the experience of Royal Perth Rehabilitation Hospital over the decade 1970-1979, complete with a detailed estimate of its cost effectiveness. An attempt is made throughout to base all discussion upon the pooled experience of many rehabilitation centers throughout the world through repeated reference to the published literature; however, the practical and statistical aspects of this work are essentially drawn from experiences in Western Australia. Contents include: basic data on pressure sores as a complication of spinal cord injury; etiological factors associated with pressure sores; practical measures for the prevention of pressure sores; the costs and benefits of a clinical pressure management program; the need for research and service in pressure sore prevention.

Wheelchair Posture and Pressure Sores. Dennis Zacharkow, R.P.T. Charles C. Thomas, Publisher, Springfield, IL. 1984. 98 pages.

"The author of this book explores wheelchair sitting posture as a major etiologic factor in pressure sore formation. Following an introduction on the prevalence and medical expense of pressure sores among the spinal cord injured, chapters detail proper sitting posture for able-bodied individuals, inherent problems with the wheelchair as a seat, essential modifications for proper sitting posture, pelvic obliquity and pressure sores, wheelchair cushion selection, acute care considerations, and pressure sore recurrences. The application of posturing principles to other patient populations concludes the text."

PROTECTIVE AIDS

Assistive and Protective Devices for the Handicapped. M.J. Martin (editor). Georgia Retardation Center, 4770 North Peachtree Road, NE, Atlanta GA 30338. July 1981. This manual provides practical information on a selection of adaptive and protective devices such as helmets, eye protectors, mittss, protective gloves, elbow restraints, pelvic supports, etc.

A Resource Guide to Protective Aids. J. Frank, K. Mallik, W. Chiu, and Lowry. Job Development Laboratory, The George Washington University, 2300 Eye Street NW, Suite 420, Washington, DC 20037. Protective aids are listed according to the part of the body to be protected and the type of protection required. Includes helmets, restraints and supports, slings and splints, pressure relief and skin protection. Lists manufacturers and suppliers.

See also **Beds**, page 57.

POSTURAL SEATING

"Specialized seating and mobility services for children and adolescents has become a clinical reality in increasing numbers of facilities during the past decade. More and more professionals are recognizing the positive contributions that can be made to the lives of these individuals through the judicious provision of appropriate seating and mobility technology. Commercial suppliers are also responding to this awakening market. Particularly in the past five years the number of commercial options available to families and clinicians has drastically increased. Current research efforts suggest that this trend will continue, but with increased emphasis being focused on the needs of the more severely handicapped."

from Preface, Seating for Children with Cerebral Palsy: A Resource Manual. Elaine Trefler, Editor

Although clinically useful publications are beginning to be available, seating workshops continue to be an important way to exchange practical information. This article by Rick Holte was originally presented at a seating workshop at Stanford (January 1983). He gives an overview of the technology currently being used to produce postural seating systems. Its tone is more informal than a publication usually permits, almost chatty, but it's a little less intimidating than some of the other discussions of foams, plastics, shells, etc. He also provides some useful tips to consider if you are thinking about getting into the custom-seating market.

(There is also a complete and somewhat more formal discussion of these technologies in Seating for Children with Cerebral Palsy: A Resource Manual, Elaine Trefler, Editor.)

A BRIEF GUIDE TO POSTURAL SEATING TECHNOLOGY

I. CONVENTIONAL METHODS

A Traditional Insert Fabrication

1 Description: Usually using plywood, polyurethane foam and vinyl upholstery, an insert is made to suit an individual based on anatomical measurements. Depending on how it's done, the insert may look like a foam-lined plywood shell (box insert) or a padded seat and separate back with lateral restrictions (bread-board insert).

2. Advantages: Low overhead and readily available technology are the chief assets of this technique. With a bit of skill and patience, a wide variety of insert styles can be produced.

3 Limitations: Depending on the local labor rate, and degree of disability, this method may be more costly than similar inserts that are available commercially. Using this method, for example, it can be very difficult and costly to produce a total contact supportive back for someone with extreme scoliosis. Upholstery of an awkwardly shaped cushion can be a limitation. Finally, the plywood itself can give off splinters, absorb fluids, and add excess weight to the seat.

4 More Information: A good brochure entitled "Technical Aspects of Cerebral Palsy Seating and Terms" was prepared by the Rehabilitation Engineering Department, Ontario Crippled Children's Centre, Toronto, Canada.

Commercial sources of pre-fabricated plywood, foam and vinyl inserts (or close variations) include ERAC, Portland, OR, Rifton Company, Rifton, NY, Kaye Products, Durham, NC, Canadian Wheelchair, Ltd., Toronto, Canada, MSC Corporation, Detroit, MI, Luxury Liners, Arcadia, CA, Mobility Plus (formerly Mulholland Corporation), Santa Paula, CA (they have a new wheelchair-based insert system).

B Old Methods, New Materials

1 Description: Increasing numbers of centers are substituting thermoplastics for plywood in their custom seating programs. The thermoplastics -- usually ABS, Kydex, polyethylene or polypropylene -- can be thermoformed or bent to give contouring which is unavailable with plywood.

2 Advantages: More contouring means less padding. This new generation of conventional inserts is usually lighter and more streamlined than their plywood predecessors.

Additionally, thermoplastics do not splinter or absorb moisture. Finally, if molds are made, repeatable seating modules can be made. This has proven useful in speeding service and reducing costs, as noted in reports by Douglas Hobson (University of Tennessee, Memphis -- MPI System) and Richard Holte (Rehabilitation Centre for Children -- another modular system). But, we'll get to full-blown modular systems in a minute.

3 Disadvantages: Some of the thermo plastics are susceptible to embrittlement in extremes of cold weather. Care must also be taken that parts which are vacuum-formed are not thinned out and greatly weakened.

4 More Information: Suitable thermoplastics can be bought from your favorite local supplier, or big firms such as Cadillac Plastics. Borg-Warner has assembled a useful booklet with tips on handling and forming ABS. United States Manufacturing Company of Pasadena, California -- chiefly a supplier to the prosthetics/orthotics industry -- has also produced a monograph on thermoforming plastics. A heater for bending thermoplastics can be made inexpensively using a bar heating element -- but watch the local electrical and safety codes! Hand-held heat guns are helpful for auxiliary heating sources, for delicate work, and for small local reliefs.

C Modular Plastic Seating Systems

1 Description: A series of pre-fabricated seat and back modules is available, possibly in differ-

ent sizes. These are selected by appropriate size (and style, if applicable) and usually positioned in a wheelchair on mounting hardware that is also part of the system. Thus, a personalized custom insert is assembled from stock components by careful selection and adjustment.

2. Advantages: By utilizing the same modules in assessment phase as in the final insert, one has a fairly clear idea of the probable effect of the insert. Assessment is speeded and largely removed from the realm of conjecture. Prefabrication should allow central production, reducing price per unit, and making the service more widely available by avoiding the necessity of involving very highly specialized people in the fabrication of all inserts.

In addition to this theory, three reports have emerged (Trefler, Tooms, and Hobson, 1978; Holte, 1980; Seeger and Sutherland, 1981) stating the success and wide applicability of their systems.

3. Disadvantages: If you have to wait for parts, your program grinds to a halt. The alternative is to stockpile, which adds to your overhead.

This concept does not work for everyone. Persons having moderate to severe disabilities are not generally good candidates, nor are high-tone, profoundly involved individuals with spasticity.

The comments above in Section IB3 on durability of plastics are germane.

4. More Information: The Memphis Insert System (MPI) is available through MED dealers. For information on the Winnipeg work, contact Mr. Michael Forbes, Director, Special Devices Department, at the Rehabilitation Centre for Children in Winnipeg. You can correspond with Dr. Barry Seeger at the Regency Park Centre for Physically Handicapped Children in Kilkenny, South Australia. A modular plastic system for young children is the Achiever Seat, distributed by G.E. Miller of Yonkers, New York. Finally, the Gunnell Company of Vassar, Michigan, produces a series of fiberglas shells (and several other accessories) which can be padded and upholstered as needed.

D. More Commercial Equipment

1. Adapted Wheelchairs: There are a number of wheelchairs which are manufactured with postural support in mind. Some have quite a few adaptations, others almost none. And, some manufacturers will custom-make parts to your specifications. Adapted wheelchairs include those manufactured by Gendron Archbold of Ohio, the Avon DeLuxe by Newton of England; the Postura by Everest and Jennings of Camarillo, California, the Multi-Position Chair (more of a bed, really), also be Everest & Jennings; the original Mulholland Chair, on its own base; and the Hogg Transportation Chair and the wooden relaxation chair, available through several catalog supply firms.

2. Transport Chairs: The original transport chair by OrthoKinetics of Wisconsin has been joined by the Safety Travel Company chair, produced in Elyria, Ohio, and several other brands. The Pogon or MacLaren umbroller-style stroller should be familiar to most. Another fold-up stroller offering less support than a transport chair, but more than a simple unmodified stroller, is the Cruiser stroller, made by Convaid of Palos Verdes, California.

For children up to 100 lbs., the Britax car seat is said to meet British safety standards. It is available through Abbey Medical, or Childsafe Company (new name: Columbia Medical Manufacturing ed.) in Pacific Palisades, California.

For automobile travel, infants could be seated in any number of safety-tested car seats. Larger children might use a trunk harness and lapbelt system offered by the Mothercare Company of England. Another system is manufactured by Safe 'n' Sound Pty Ltd. of Morphettvale (Box 421), South Australia. Strolee of California also manufactures a booster seat, and a harness system.

3. Non-Insert Trunk Supports: The Burnett Body Support is a vest-like bag filled with polystyrene beads. When evacuated, the vest becomes nearly rigid. It can be molded to different shapes, and is manufactured by Innovention Products, Ltd. of Bushey, Hertsfordshire, England. They also produce a hand-operated pump for extracting the air.

Several companies offer adjustable lateral trunk supports which can be retrofitted to a wheelchair. The STS pads are available through MED distributors, who also carry the MED trunk supports. Scimedics Company of Anaheim, California produces its own trunk pads. Major catalog supply houses offer different syles of adjustable lateral trunk pads.

II. INDIRECT CUSHION FABRICATION TECHNIQUES

This section will include special fabrication techniques in which the insert component is not made directly on the patient's body, but remotely. Nearly all techniques start with a casting, then proceed to a plaster replica of the anatomy, on which is produced the final insert. This casting technique is a specialty unto itself, and will be presented as such.

Generally, custom fabrication techniques are not invoked unless standard approaches have been tried or assessed and rejected, usually for reasons of poor results, high cost, long delivery time, or all of the above. Custom fabrication techniques, direct or indirect, are thus a resource of last resort in many cases.

A. Plywood, Foam, Vinyl Custom Insert

1. Description: Technique is applied as described in Sections IA and IB, except that more emphasis must be put on grinding out the foam to a suitable shape.

2. Advantages: As before, this can be the cheapest method, when it works. This is my preferred method for making unusual seat components. It is possible to provide lateral bolsters to stabilize a drifting pelvis, allow for a leg-length discrepancy, produce a wedged or stepped anterior of seat for pelvic containment and hip

flexion, or provide selecting padding build-up under an oblique pelvis. By upholstering components separately, and positioning them by bolting to a plastic external shell, one can remove, replace, or adjust the components more easily and less expensively than if a total seat replacement were needed.

3. Limitations: It can be quite difficult to make a deep total contact back support for the person with a significant scoliosis, rotation, rib hump, and so forth. But, it could be considered for a person with a slight deformity of the back, especially if lateral trunk bolsters are used in conjunction (they allow you to provide a shallower cutout by protruding forward to provide the support on the sides).

B. Traditional Orthotics

An orthosis can be effective in a system for a wheelchair-using person. It can be combined with a simple insert, where the orthosis provides the structural support to the spine and the insert supplements the person's balance and secures him in the chair. An advantage of orthoses is that they can continue to provide support after the person has left the wheelchair, even to the point of being worn in bed or in the bath.

C. The Gilette Seating Support Orthosis

1. Description: The Gilette system borrows heavily from standard orthotics practice, and is literally a wheelchair-based orthosis. The patient is cast while prone with hips flexed. The insert is a combination seat-and-back support, which may have a front closing apron and/or a head support appended to it.

2. Advantages: Borrowing from orthotics practice is a good idea, as this opens up a tremendous potential source of custom inserts. Minor adjustments for growth, etc., can be made simply by heating and flaring the shell. An integral seat/back shell made from the casting assures the relative positions are not lost. The system is light in weight.

3. Limitations: As with many custom-made orthoses, this seat will have a limited lifespan, depending upon the growth pattern of the user. Orthotists providing the insert should be experienced in seating as well as orthotics. The casting method is effective, but it will evoke controversy in the NDT-therapy community when used with cerebral palsied patients.

4. More Information: More information can be found in the article entitled "The Gilette Seating Orthosis" by Martin Carlson and Robert Winter in Orthotics and Prosthetics, December 1978, or you can write to the authors at Gilette Children's Hospital in St. Paul, Minnesota. A central fabrication service is available through Symplex Orthotics Systems of Winter Park, Florida.

D. Thermoformed Shallow Back and Lateral Bolsters

1. Description: From a plaster positive, a shallow back is thermoformed and lateral trunk supports affixed to it. The back provides a solid place to anchor the side trunk pads, and must be thermoformed to accommodate severe spinal deformities. It is not necessary for the back to come far forward on the sides of the trunk, as the lateral pads will fulfill the support function there.

2. Advantages: The lateral trunk pads can be moved, or replaced, without rejecting the entire back. Thus, an element of modification is available. The lateral bolsters should allow the user better natural ventilation by providing less circumferential containment than some other techniques.

3. Limitations: The relative positions of seat, back and bolsters must be noted carefully. The process is fairly time-consuming.

4. Further Information: Further information is available from Rick Holte at the Rehabilitation Engineering Center, Children's Hospital at Stanford in Palo Alto, California.

E. Vacuum Fixation (one piece)

1. Description: Chailey Heritage, Surrey, England, was one of a few institutions who pioneered the vacuum-fixation (evacuated bean bag) casting technique. After producing a plaster positive of the client, from head to toe if necessary, a seat was thermoformed over the plaster model. A trial fitting established trim and attitude lines. A second sheet was thermoformed to produce a more regular exterior and suitable base for interfacing. Variations on this large body cast from bean bag impression method have been reported by the University of Virginia, Tufts New England Medical Center, the Institute of Medical Physics in Utrecht, Moss Rehabilitation Center, Derbyshire Royal Infirmary, and Dundee Limb Fitting Center.

2. Advantages and Limitations: As with many of the impression-originated techniques, one trades off speed and low cost for predictability and process control with this method. As a one-piece molded insert, it has the advantage of preserving the relative seat/back orientation, but lacks somewhat in adjustability. Large ones will be awkward to handle (and to make, for that matter). one-piece inserts offer the hope of use in a non-wheelchair base, which could be handy.

3. More Information: Consult the following publications.

Prosthetics and Orthotics International. Cost Effective Molded Seating for the Handicapped Child, McQuilton and Johnson, 1981. Molded Supportive Seating for the Disabled, Ring, Nelham, and Person, 1978, Vol. 2.

A Method for Custom Seating of the Disabled. Pritham and Leiper. Orthotics and Prosthetics, December, 1981.

Proceedings, International Conference on Rehabilitation, 1980, Toronto. Useable-Reusable Casting Technique for Customized Total Contact Seating, O'Reagan and Law; Individually Customized Postural

Support System, May, et al

F. Foam-in-Box (FIB) Method

1. Description: A plaster positive of the client's back is prepared and placed into an adjustable mold box. Liquid foam components are mixed, poured in the mold box, and react chemically to produce a flexible urethane foam. The cushion is then molded around the plaster positive. Later, it is upholstered and mounted in a shell for support.

2. Advantages: Because a foam cushion is produced, it will "forgive" areas of high point contact better than a padded rigid shell. A high quality, custom-forced cushion can be made with anterior "wrap" of the lateral portions past the thoracic midline.

3. Limitations: Foam is an insulator, and in hot climates this could be a very uncomfortable insert. Because of the relative compressibility of the foam, firm auxiliary lateral trunk supports should be added for someone with a collapsing scoliosis.

4. More Information: See the 1980 Proceedings of the International Conference on Rehabilitation Engineering, Toronto, A Comparison of Three Custom Seating Techniques, by Forbes, Holte, Paul, and van Kampen. John Rodgers, of Scimedics in Anaheim, California, may be able to provide technical and/or product assistance. Pin Dot products of Northbrook, Illinois, offers a central fabrication FIB service, calling it Contour-U. Their product is slightly different than that described above, and they can provide extra support for the trunk, head, feet, and so on.

G. Evacuable Bean Bag Casting Method

1. Description: The patient is placed against a polymeric or latex bag filled with small polystyrene beads. By drawing the air out of the bag, the beads push close together, becoming nearly rigid with high vacuum. Because the bag itself is supple, it conforms to the person's surface anatomy.

Often, the beanbag is used to approximate the final insert cushion. Modifications for improved patient comfort and/or posture can be made by allowing a bit of air back into the bag, working the beads into the new, designed position, then reevacuating the air. Using several bags (or a multiple compartment bag) allows adjustment of part of the cushion while the rest of the position is retained.

2. Advantages: This method of casting permits a well-controlled evaluation and impression-taking session. By using the bean bag to mock-up the final insert, the patient's reaction can be viewed.

3. Limitations: The major drawbacks are the lengthy time required to produce an insert from the impression, and the investment in equipment that is necessary.

4. More Information: A hand-operated vacuum pump and fairly small bean bags can be obtained from Innoventions Products, Ltd., 10 Coldharbour Lane, Bushey, Hertsfordshire, United Kingdom. PRA Plastics and Developments, Ltd., of 21A Kingsland High Street, Dalston, London, United Kingdom, will custom make a set of evacuable bags to your specifications.

III. DIRECT CASTING METHODS

A. Foam-in-Place (FIP) Method

1. Description: The patient is placed against a sheet of latex rubber draped over a closed box. Two-part liquid foam is mixed, poured into the mold box, and reacts chemically to produce a flexible polyurethane foam. The foam fills the cavity of the box, and forms an impression of the part of the patient pressed against and into the latex sheet. The cushion thus formed is removed from the mold box and installed in the wheelchair.

2. Advantages: The greatest advantage of FIP over indirect methods is the immediacy of results. Delays to the patient are minimized. The final cushion is produced almost immediately, so there is no waiting to see if a useful cushion is produced from the casting impression.

3. Limitations: Great caution should be exercised in handling and using the foam components. Misuse may result in quite unpleasant consequences.

Supporting the person in the desired position can be difficult. They should not be moved for three to five minutes while the foam "sets up," or it may collapse and one must start again.

The mold cannot be "packed" (overcharged) or the patient's position will be compromised. In the Foam-in-Box method (Section II-F), this "packing" produces a higher density, higher quality foam.

4. Further Information: The FIP method has been described by Hobson, Driver, and Hanks in The Proceedings of the 5th Annual Conference on Systems and Devices for the Disabled (Houston, 1978) under the title "Foam-in-Place Seating for the Severely Disabled: Preliminary Results." Also worthy of note are the reports on toxicity (actually nontoxicity) and safe handling procedures prepared by Mr. Hobson, of the University of Tennessee, Memphis.

B. Solidified Beanbag

1. Description: The patient is placed against a flexible bag partly filled with small diameter polystyrene beads. The bag is evacuated, and the beads form an impression of the occupant. Next, adhesive is injected into the bag. It adheres the individual beads together, forming a cushion directly against the patient's body. The patient is removed, and the cushion is smoothed and mounted in the wheelchair.

2. Advantages: This is also a very rapid method of making an insert. The speed of the FIB is combined with the control of position afforded by the bean bag evacuation technique. The plaster

intermediary step is eliminated.

3. Limitations. This is one of the only methods where the patient interface material is the same as the structural body of the insert. Clearly, one may have problems balancing these, either producing an insert which is strong but too hard, or soft but not durable. The University of Tennessee Rehabilitation Engineering Center is considering this problem by investigating quick-cure flexible matrix materials. Alternatively, the insert could be supported in a rigid shell for strength and/or lined with a thin layer of compliant foam and upholstered.

The Orthopedic Research and Locomotion Assessment Unit (ORLAU) at Oswestry, Shropshire, United Kingdom, seems to have lost some of their enthusiasm for this method. Their 1981 report finds no problem with durability, but leaves the impression that smoothing the seats was proving to be more laborious than originally thought.

4. More Information. Write to ORLAU and ask for their 1980 and 1981 reports, and to the University of Tennessee-Memphis Rehabilitation Engineering Program for Annual Report No. 6.

The Southern Research Institute produced an article entitled "The DESEMO Customized Seating Support -- Custom-Molded Support for Severely Disabled Persons." It was written by Sandy Moore, et al., and appeared in the April, 1982 edition of the Journal of the American Physical Therapy Association. A kit for providing inserts by this method is being marketed by Desemo, Inc., of Savannah, Georgia.

John Rodgers, of Scimedics Company, Anaheim, California, may be able to offer technical advice and/or product support.

C. Shapable Matrix

1. Description. This system is unique in that it has an adjustable surface which can be shaped, adjusted, and enlarged to suit the client's needs. The surface is made up from literally hundreds of small interlocking plastic elements. Mechanical devices can be tightened to hold a shape, or loosened to permit local adjustments. The shapable surface is supported on a tubing frame, and covered by a layer of foam.

2. Advantages. The shapable quality allows minor and major adjustments for customizing. Extensions for growth can be made. No intermediate plaster work is needed. An incidental benefit is the good natural ventilation with this approach.

3. Disadvantages. There may be a problem with hygiene, as there are literally hundreds of small places to clean. Some large, strong patients may be able to bend the matrix out of shape. The issue of upholstery is not yet entirely resolved.

4. More Information. Two prototype systems are under development. One is at the Medical Engineering Resource Center, University of British Columbia, Vancouver, Canada. The other is being done by Steven Counsins at BRADU, Roehampton, London, United Kingdom. More than 1,000 units of the UK design have been marketed in Europe. USA distribution is being undertaken by MED. Contact Jeff Offner, REHAB Co., 2811 Zulette Avenue, Bronx, NY 10461. The early work on this concept is described in a paper by the MERU group that appeared in the 1980 Proceedings of the International Conference on Rehabilitation Engineering in Toronto.

Richard N. Holte, MSc. Rehabilitation Engineering Center, Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304

Complete references to papers cited can be found in the **Postural Seating Bibliography**, page 173.

151

SEATING SERVICE PROGRAMS

The facilities listed represent those responding to a request for information in the University of Tennessee Rehabilitation Engineering Seating Newsletter. They are listed alphabetically by STATE.

Centers who provide seating services, but who did not have access to the initial questionnaire, are welcome to send information about their programs to University of Tennessee, Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN, attn: Elaine Trefler, OT, for inclusion in an updated list.

No endorsements are implied by inclusion on this list. If you have information to add to, change, or delete from this list, please send it to the RESNA Sourcebook editor.

USA

Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, CA 94304
415/327-4800

Newington Children's Hospital
181 E. Cedar Street
Newington, CT 06111
203/667-5260

University Hospital School
University of Iowa
Iowa City, IA 52242

Capper Foundation for Crippled Children
3500 W. 10th Street
Topeka, KS 66604
913/272-4060

University of Kansas Medical Center
39th and Rainbow Blvd.
Kansas City, KS 66103
913/588-6898

Lakeville Hospital
Lakeville, MA 01602

Gillette Children's Hospital
200 E. University Vanue
St. Paul, MN 55101
612/291-2848

University of Mississippi Medical Center
Orthopedic Division
2500 North State Street
Jackson, MS 39216
601/987-4557

Kessler Institute for Rehabilitation
Pleasant Valley Way
West Orange, NJ 07052
201/731-3600

Blythdale Children's Hospital
Bradhurst Avenue
Valhalla, NY 10595
914/592-7555

Case Western Reserve University
Rehabilitation Engineering Program
3395 Scranton Road
Cleveland, OH 44123
216/359-3480

Elizabethtown Hospital & Rehabilitation Center
Elizabethtown, PA 17022
717/367-1161

Shriners Hospital for Crippled Children
Greenville Unit
2100 N. Pleasantburg Drive
Greenville, SC 29609
803/244-4530

University of Tennessee
Rehabilitation Engineering Program
682 Court Avenue
Memphis, TN 38163

Texas Scottish Rite Hospital for Crippled Children
2222 Welborn Avenue
Dallas, TX 75219
214/521-3168

University of Virginia
Rehabilitation Engineering Center
P.O. Box 3368
University Station
Charlottesville, VA 22903
804/977-6736

Department of Rehabilitation Engineering
University Hospital & Clinics
Room E3/211
600 N. Highland Avenue
Madison, WI 53792
608/263-8060

Canada

Calgary General Hospital
Orthotic Clinic
841 Centre Avenue NE
Calgary, Alberta T2E 0A1

Glenrose Hospital
Physical Rehabilitation Unit
10230-111 Avenue
Edmonton, Alberta T5G 0B7

Rehabilitation Center for Children
633 Wellington Crescent
Winnipeg, Manitoba R3M 0A8
204/452-4311

Forest Hill Rehabilitation Centre
Woodbridge Street
Fredericton, New Brunswick E3B 4R3
506/455-3309

Izaak Walton Killam Hospital for Children
5850 University Avenue
Halifax, Nova Scotia B3J 3G9
902/424-3025

Cerebral Palsy Centre
Chedoke-McMaster Hospital
Box 2000
Hamilton, Ontario
416/388-0240

K.W. Rotary Children's Centre
828 King Street W.
Kitchener, Ontario W2G 1E8
519/579-3850

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8
416/425-6220

Royal Ottawa Regional Centre
P&O Department
505 Smyth Road
Ottawa, Ontario K1H 8M2
613/737-7350

Hospital Marie Enfant
5200 est Belanger
Montreal, Quebec H1T 1C9
514/374-1710

Saskatchewan Council for Crippled Children & Adults
1410 Kilburn Avenue
Saskatoon, Saskatchewan S7M 0J8
306/663-1694

University Hospital Physical Medicine & Pediatrics
Saskatoon, Saskatchewan
306/343-3560
306/652-3871

Also see the list of service centers in the **COMMUNICATION** section. Since it is usually necessary to have the person properly seated before a communication aid can be recommended, most communication services have a source for seating nearby

SOME COMMERCIAL SOURCES OF SEATING AND MOBILITY SYSTEMS

WHEELCHAIR POSITIONING SYSTEMS

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90252

Columbia Medical Manufacturing
(formerly Childsafe)
P.O. Box 633
Pacific Palisades, CA 90272
213/454-6612

ERAC - Creative Rehab Equipment
513 N.E. Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

Everest & Jennings, Inc
3233 East Mission Oaks Blvd
Camarillo, CA 93010
805/987-6911

Gendron, Inc
Lugbill Road
Archbold, Ohio 43502
419/445-6060
800/537-2521

Gunnell Manufacturing Company, Inc
221 N. Water Street
P.O. Box 1694
Vassar, MI 48768
517/823-8557

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

J.A. Preston Corp
71 Fifth Avenue
New York, NY 10003
800/221-2425

Mobility Plus
(formerly L. Mulholland Corp.)
215 N. 12th Street
P.O. Box 391
Santa Paula, CA 93060
805/525-7165

Newton Aids (England)
U.S. Distributor
Newton, USA
469 Ridge Road W.
Rochester, NY 14615

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Palm Beach Medical
c/o Biomedics
P.O. Box 131, FPS
Springfield, MA 01188

Rifton Equipment for the Handicapped
Rifton, NY 12471
914/658-3141

Theradyne Corporation
21730 Hanover Street
Lakeville, MN 55044
612/469-4404

Also see **WHEELCHAIR** section, Commercial Sources of Wheelchairs

MODULAR SEATING SYSTEMS

Aames Rents & Sells
122 No. Glassell
Orange, CA 92666

Adaptive Rehab Equipment
Conmed Equipment Corp
1130 Donamy Glen
Scotch Plains, NJ 07076
201/561-0906

Canadian Wheelchair Mfg.
20 Magnetic Drive
Downsview, Ontario M3J 2C4
CANADA
416/661-3556

ERAC - Creative Rehab Equipment
513 N.E. Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

Freedom Designs, Inc
1884 Eastmar Avenue, Suite 11
Ventura, CA 93003

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

R.C. Hayes (Leicester) Ltd
Main Street
Kirby Muxloe
Leicester, England (0533)
394738

J.A. Preston Corp
71 Fifth Avenue
New York, NY 10003
800/221-2425

Kay Products, Inc
Adaptive Equipment for Children
1010 East Pettigrew Street
Durham, NC 27707
919/688-1601

Luxury Liners
18929 Norwalk Blvd
Suite 105
Artesia, CA 90701
213/926-4255

Medical Equipment Distributors (MED)
1701 S. First Avenue
Maywood, IL 60153
312/681-2828

Miller Rental & Sales
284 Market Street
Akron, OH 44308

Mobility Plus
(formerly L. Mulholland Corp.)
215 N. 12th Street
P.O. Box 391
Santa Paula, CA 93060
805/525-7165

Modular Seating Components
19326 Woodward Avenue
Detroit, MI 48203
213/368-3516

Otto Bock U.S.
Orthopaedic Industry
4130 Highway 55
Minneapolis, MN 55422
800/328-4058

Pin Dot Products
P.O. Box 642
Northbrook, IL 60062

Rehab Equipment Systems
P.O. Box 21566
Seattle, WA 98111
206/285-1114
distributor for:
Adaptive Engineering Lab
4403 Russell Road
Building 2A, Unit A
Lynwood, WA 98037
206/774-7993

Rifton Equipment for the Handicapped
Rifton, NY 12471
914/658-3141

Special Devices Department
Rehab Centre for Children
633 Wellington Crescent
Winnipeg, Manitoba R3M 0A8
CANADA
204/452-4311

Variety Village
3701 Danforth Avenue
Scarborough, Ontario M1N 2G2
CANADA

CONSTRUCT-A-FOAM SEATING

Alimed, Inc.
68 Harrison Street
Boston, MA 02111
800/225-2610

Modular Medical Corp.
1558 Hutchinson River Parkway East
Bronx, NY 10461
212/829-2626

MOLDED BODY SUPPORT

DESEMO, Inc.
P.O. Box 22309
Savannah, GA 31403
800/342-7661

Freedom Designs, Inc.
1884 Eastmar Avenue, Suite 11
Ventura, CA 93003

Handicapped Educ. Learning Products (HELP), Inc.
P.O. Box 9763
Sacramento, CA 95823
916/421-1202

Innovention Products, Ltd.
51 Coldharbour Lane
Bushey, Herts WD2 3NU
ENGLAND
01-950-3695

J.A. Preston Corp.
71 Fifth Avenue
New York, NY 10003
800/221-2425

Kay Products, Inc.
Adaptive Equipment for Children
1010 East Pettigrew Street
Durham, NC 27707
919/688-1601

McLaren, Inc.
P.O. Box 2004
Department D
New York, NY 10017
212/889-7547
800/233-1224

Nottingham Medical Equipment Company
Melton Road
W. Bridgford
Nottingham NG2 6HD
ENGLAND
0602-234251

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Pin Dot Products
P.O. Box 642
Northbrook, IL 60062

Rogers & Associates
700 N. Valley St., #B
Anaheim, CA 92801
714/991-3880

Symplex Orthotic System
P.O. Box 2031
Winter Park, FL 32790
305/645-0414

CARSEATS

Century Products, Inc.
Stow, OH 44224

15

Columbia Medical Manufacturing (Britax)
(formerly Childsafe)
Box 633
Pacific Palisades, CA 90272
213/454-6612

CORAM-Paris
209, rue de Saint-Maur
75010 Paris, FRANCE
205-48-46

LIC-REHAB
Svetsarvagen 4
S-17183 Solna
SWEDEN
Stockholm 98-10-60
Telex 105-28-LICS

Questor Corporation (Bobby-Mac)
1801 Commerce Drive
Piqua, OH 45356
513/773-3971

RECARO Automobile Seating System
1152 E. Dominguez Street
Carson, CA 90746

STROLLERS

Adaptive Therapeutic Systems, Inc.
965 Dixwell Avenue
Hamden, CT 06514

The Bobby-Mac Co., Inc.
P.O. Box 209
Scarsdale, NY 10583
914/723-3442

Childsafe (Britax)
Box 633
Pacific Palisades, CA 90272

Convaid Products, Inc.
P.O. Box 2731
Palos Verdes, CA 90274
213/377-0016

Credesign AB
Bergsunds Strand 31
S-11738
Stockholm, Sweden

Equipment Shop
P.O. Box 33
Bedford, MA 01730
617/275-7681

Handicapped Educ. Learning Products (HELP), Inc.
P.O. Box 9763
Sacramento, CA 95823
916/421-1202

LIC-REHAB
Svetsarvagen 4
S-17183 Solna
SWEDEN
Stockholm 98-10-60
Telex 105-28-LICS

MacLaren, Inc.
P.O. Box 2004
Department D
New York, NY 10017
212/889-7547

Newton, USA
469 Ridge Road W.
Rochester, NY 14615

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Rifton Equipment for the Handicapped
Rifton, NY 12471
914/658-3141

Theradyne Corporation - Genac/Pogon
21730 Hanover Street
Lakeville, MN 55044
612/469-4404

TRAVEL CHAIRS

CORAM-Paris
209, rue de Saint-Maur
75010 Paris, FRANCE
205-48-46

Freedom Designs, Inc.
1884 Eastmar Avenue, Suite 11
Ventura, CA 93003

Handicapped Educ. Learning Products (HELP), Inc.
P.O. Box 9763
Sacramento, CA 95823
916/421-1202

Medical Equipment Distributors (MED)
1701 S. First Avenue
Maywood, IL 60153
312/681-2828

G.E. Miller, Inc.
484 South Broadway
Yonkers, NY 10705
800/431-2924

Modular Medical Co.
1558 Hutchinson River
Parkway, E.
Bronx, NY 10461

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Palmco Engineering
12005 Rivera Road
Santa Fe Springs, CA 90670
213/696-5235

J.A. Preston Corp.
71 Fifth Avenue
New York, NY 10003
800/221-2425

Safety Travel Chairs, Inc.
147 Eady Court
Elyria, OH 44035
216/365-7593

Stainless Medical Products
9389 Dowdy Drive
San Diego, CA 92126
714/578-6920

SEATING SYSTEMS FOR TRAVEL CHAIRS

Adaptive Engineering Lab
4403 Russell Road
Building 2A, Unit A
Lynwood, WA 98037
206/774-7993

ERAC - Creative Rehab Equipment
513 NE. Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

Freedom Designs
1884 Eastmar Avenue, Suite 111
Ventura, CA 93003

SIDE-BY-SIDE TRIALS: AN EVALUATION METHODOLOGY FOR COMPARATIVE TESTING OF MODULAR WHEELCHAIR INSERT SYSTEMS

At the 6th Annual Conference on Rehabilitation Engineering, held in San Diego, California, in 1983, this paper was presented by Susan P. Schaezlein, OTR, and Richard N. Holte, MSc., of the Children's Hospital at Stanford Rehabilitation Engineering Center, Palo Alto, California.

These are some excerpts from the paper, which was written in January, 1983. The findings presented at the conference were essentially the same as the preliminary findings noted in the report.

"Over the past five years a number of wheelchair based modular seating systems have been developed and marketed to provide postural control for individuals with cerebral palsy. Theories have been advanced to explain how seating systems should be configured for an individual. The characteristics and components of these seating systems have been designed to provide an orientation in space, provide support or exert forces on the body to improve anatomical alignment and stabilization, and influence muscle tone to improve seating posture. A method of comparing the relative merits between these systems has not yet been formalized.

"Side-by-Side Trial methodology was developed at the Rehabilitation Engineering Center, Children's Hospital at Stanford, as a process to evaluate functional and technical features of four commercially available modular wheelchair seating systems and to determine: 1) the specific features and components of a modular seating system which improve or decrease user function; 2) technical modifications which could be made on existing seating systems to better meet functional needs of users; and 3) necessity for the development of a new modular seating system. Using a side-by-side evaluation methodology, child subjects with the diagnosis of cerebral palsy are fitted in each of the four seating systems and perform specific functional activities. Each seating system is rated on ability to provide postural control; effects on certain functional activities; manageability by a parent; and technical characteristics....

"At this publication, 4 out of 10 subjects have participated in the Side-by-Side trials of modular wheelchair insert systems. Preliminary impressions of the four systems under evaluation are:

Britax Seat

"The Britax is not felt to be appropriate as a definitive wheelchair insert system for the subject population in this study. Its size and shape were limiting factors in user function. It is best used as a car seat, as recommended by the manufacturer.

"Positive Features: The user feels secure in the seat. Mid-line bimanual hand use is facilitated by blocking excessive horizontal abduction at the shoulders. The harness system secures the pelvis. It can be adjusted without tools.

"Negative Features: Elbows can get caught between body and side structure of seat during activities. The harness system cuts into the user's shoulders. Wheelchair wheels cannot be reached because of the side structure. Shell structure limits the user's visual field.

Mulholland Adaptive Positioning System for Standard Wheelchairs

"This is an appropriate insert system for the subject population. It provided better postural control for the more severely involved subjects.

"Positive Features: Provides good postural control and has a wide range of adjustability to meet user needs. Functional activities were improved with the exception of transfers.

"Negative Features: Appearance is very contraption-like. Technical knowledge and a variety of tools are needed to assemble and adjust the system. Shoulder pads, lateral trunk supports and pelvic stabilizers are not user operable, preventing independence in transfers. Attaching the assembled seat base and seat back onto the wheelchair frame is relatively difficult.

Winnipeg Modular System

"The system is appropriate for this subject population. It can be easily managed by parents and was favored for its appearance.

"Positive Features: Overall appearance is good. It is easily removed and inserted to wheelchair base; functional activities were improved. It provided good control for moderately involved subjects.

"Negative Features: Tools, machinery and technical knowledge are needed to assemble the system. It is not available on the commercial market in the United States.

MPI

"This is appropriate seating for this subject group. It provided postural control for the less involved subjects, but not quite enough for more severely involved subjects.

"Positive Features: Seat depth, back height, and seat angle adjustments are versatile. It has the appearance of a child's chair.

"Negative Features: Material is perceived as breakable and uncomfortable. Footrest and headrest hardware needed to be modified before they would fit into their brackets. Independent or standing transfers were limited by the footrest component. Handles for the angle adjustment clamps broke off.

CONCLUSIONS

"The modular seating system which effectively positioned a child had a positive effect on performance of most functional activities. Components of the systems, however, can restrict user functions. Fixed footrests and abduction units which were not user operable decreased performance in transfers. The relationship between the modular seating system and its wheelchair base influenced effectiveness of the system. The relationship of the footrests to the seating system influenced mobility. Appearance was important to therapists and parents and was generally the first feature considered when assessing a system. Although manageability of a system by a parent was considered important, the parents tended to place the child's needs first. They indicated a willingness to put up with a cumbersome system if it helped improve posture and function of their child.

The Side-by-Side Trials have been a useful method of gathering comparative information about modular seating systems. The methodology developed for this project could be useful in the comparative evaluation of other seating systems and other assistive devices.

For the entire paper, see Proceedings, 6th Annual Conference on Rehabilitation Engineering, San Diego, 1983.

or contact the authors at

Children's Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA 94304, 415/327-4800, x 345.

More information on guidelines for evaluating the usefulness of mobility devices can be found in the section on Wheelchair Mobility Device Evaluation Guide.

SOME PUBLICATIONS ON POSTURAL SEATING AND POSITIONING

Functional Aids for the Multiply Handicapped
Isabel P. Robinault. Harper and Row Publishers, Hagerstown, MD. 1973. See pages 139-177.

Handling the Young Cerebral Palsied Child at Home
Nancie R. Finnie. E.P. Dutton. Second edition 1975. Information on home management of children with cerebral palsy for parents, teachers, and therapists. Contains suggestions on do-it-yourself devices as well as commercially available equipment, particularly mobility aids. Also includes lists of resources for equipment and accessories.

Positioning the Client with Central Nervous System Defici's: Wheelchair and Other Adaptive Equipment
A.F. Bergen and C. Colangelo. Valhalla Rehabilitation Products Publications, Ltd., P.O. Box 195, Valhalla, NY 10595. 1982. 191 pages. "This manual is a guide for prescribing positioning devices which will allow maximum function with minimal pathology for the person who has abnormal muscle tone due to CNS dysfunction. It presents guidelines and principles for evaluation, problem solving, and constructing or ordering equipment.

"The text initially concentrates on the sitting posture -- adjusting the client's position to prevent deformity and to improve his or her capacity to work, learn, and recreate. The section on sitting also explains how to best achieve that goal when ordering commercially available wheelchairs. Wheelchair features are explained in a specific sequence to assist the reader in problem-solving in an orderly, logical fashion. A sample prescription blank is provided for use when ordering traditional wheelchairs.

"Since human achievement is often related to eye-hand function, problem-solving for head and upper extremity positioning is dealt with at length. A separate section on lapboards includes a discussion on when they should be provided, how to measure, and what materials might be used, in relation to specific client problems.

"The last section of the text includes alternate positioning devices (such as for prone, sideline, standing, and mobility). Many items are from Selected Equipment for Pediatric Rehabilitation, and are described in a problem/solution format using photographs and construction suggestions. New pieces have been added and old ones updated.

"The text includes over 400 illustrations and photographs, a list of addresses for further information, and a bibliography."

Positioning the Handicapped Child for Function: A Guide to Evaluate and Prescribe Equipment for the Child with Central Nervous System Dysfunction
Diane E. Ward, M.Ed., OTR. 316 Carmel Drive, St. Louis, MO 63119. March, 1983. 115 pages. $20.00. "This manual discusses the current and popular practices used in positioning the severely handicapped child. In addition, it presents a systematic approach to evaluating posture from a posture-mobility context. It analyzes the variables of posture that observably affect performance.

"This manual is written for occupational and physical therapists who serve severely handicapped children, though it may also be of assistance for parents, teachers, and nurses. It intends to guide the therapist in optimizing posture so that it can best serve movement. Facilitating this interplay between posture and movement will allow the child to be more functional and to find more satisfaction through participation."

Seating for Children with Cerebral Palsy: A Resource Manual. Elaine Trefler, O.T.R., M.Ed., editor. The University of Tennessee Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163. 1984. $20.00. "...The manual is intended to provide guidelines and decision making information in each of the critical aspects of the seating provision process. It is meant to supplement the UT-REC annual educational workshops, outreach presentations, as well as provide reference material and guidelines for clinicians seeking decision making criteria. The emphasis of the manual is on the needs of the cerebral palsied child, however, many of the principles, service delivery processes, and funding considerations apply equally to other populations of non-ambulatory individuals requiring seating and mobility.

"The manual begins with an overview of both normal and abnormal child development, followed by their implications relative to therapeutic decision making. This is followed by medical considerations: first, from the total perspective of the needs of the child and the family; and secondly, with specific concerns related to orthopedic management. An overview of basic biomechanical principles and their implications related to providing body positioning and support is then given. With this as background and rationale, the remaining sections focus on specific guidelines related to therapy decision making, technical options, material selection, and characteristics of a working delivery system process, concluded by an overview of the exigencies associated with securing the necessary funding. The appendices provide resource material related to existing clinical facilities, commercial sources, and published literature."

POSTURAL SEATING BIBLIOGRAPHY

"Adaptive Equipment for Positioning and Mobility Guidelines for Selection and Use." Adaptive Equipment Services, Belchertown State School, Belchertown, MA. March, 1979.

Aitken, K.M. "Assessment of Handicapped Child for Most Suitable Type of Chair." Occupational Therapy. October, 1973.

Anderson, B.M., et al. "The Sitting Posture: An Electromyographic and Discometric Study." Orthopedic Clinics of North America, Vol. 6, No. 1. January, 1975.

Barbato, V.J. "Hip and Back Stabilizing Unit for Wheelchair Patients." Physical Therapy Review, Vol. 38, No. 5, pp. 335-337. 1958.

Batchelor, K.W., and Farmelo, G.P. "A Basic Design of a Chair for Hemiplegics with Special Reference to the Back Shape." Dept. of Experimental Pathology, Rheumatism Research Wing, University of Birmingham, ENGLAND.

Beesley, Margrit. "The Role of the Occupational Therapist in Interfacing Communication Aids." Proceedings of the Workshop on Communication Aids for the Handicapped. University of Ottawa, Ottawa, Ontario Canada, June, 1977. pp. 55-67.

Bergen, A.F., and Colangelo, C. Positioning the Client with Central Nervous Systems Defects. Valhalla Rehabilitation Pub. Ltd., Valhalla, NY. 1982. 191 pages.

Bergen, A.F. Selected Equipment for Pediatric Rehabilitation. Blythedale Children's Hospital, Valhalla, NY. 1974.

Bergen, A.F. Supplement I for Selected Equipment for Pediatric Rehabilitation. Blythedale Children's Hospital, Valhalla, NY. 1975.

Bergen, A.F. "A Special Stroller Insert." Physical Therapy, Vol. 59, No. 3, p. 301. 1979.

Bergen, Adrienne. "Table and Chair Seat for Spastic Children." Physical Therapy, Vol. 51, pp. 1305-1306. 1971.

Bleck, E.E. "Locomotor Prognosis in Cerebral Palsy." Developmental Medicine and Child Neurology, Vol. 17, pp. 18-25. 1975.

Bleck, E.E., M.D. "Severe Orthopedic Disability in Childhood: Solution Provided by Rehabilitation Engineering." Orthopedic Clinics of North America, Vol. 9, No. 2, pp. 509-528. April, 1978.

Bleck, E.E., and Nagel, D. Physically Handicapped Children: A Medical Atlas for Teachers. Grune and Stratton, New York, NY. 1982.

Bobath, Berta. "The Very Early Treatment of Cerebral Palsy." Developmental Medicine Child Neurology, Vol. 9, pp. 373-390. 1967.

Bobath, K. "The Neuropathology of Cerebral Palsy and Its Importance in Treatment and Diagnosis." Cerebral Palsy Bulletin, Vol. 1, No. 8. 1959.

Bobath, K. "The Normal Postural Reflex Mechanism and Its Deviation in Children with Cerebral Palsy." Physiotherapy, pp. 1-11. 1974.

Bowker, J.H., and Reed, B.A. "Vacuum-Formed Plastic Insert for Neurologically Impaired Wheelchair Patients." Interclinic Information Bulletin, XII.10, pp. 7-12. July, 1973.

Brubaker, C.E. et al. "Effect of Seat Position on Wheelchair Performance." Proceedings of International Conference on Rehabilitation Engineering. Canadian Medical and Biological Engineering Society, c/o National Research Council of Canada, Ottawa, Canada. 1980.

Butler, C., and Okamoto, G.A. "Motorized Wheelchair Driving: Learning Patterns of Disabled Children." Paper presented at the American Academy of Physical Medicine and Rehabilitation, Houston, Texas, June, 1983.

Butler, C., Okamoto,G.A., and McKay, T.M. "Powered Mobility for Very Young Disabled Children." Developmental Medicine and Child Neurology, Vol. 25, pp. 472-474. 1983.

Cambell, P.H., Green, K.M., and Carlson, L.M. "Approximating the Norm Through Environmental and Child-Centered Prosthetics and Adaptive Equipment." Educational Programming for the Severely/Profoundly Handicapped: Prosthetics and Adaptive Equipment. pp. 300-320.

"Car Safety Restraints for Children." Consumer Report, pp. 314-317. June 1977.

Carlo, D. "A Chair for the Child With Hypertonic CNS Dysfunction." Physical Therapy, Vol. 57, No. 10. October, 1977.

Carlson, J., and Winter, R. "The Gillette Sitting Support Orthosis." Orthotics and Prosthetics, Vol. 32, No. 4. December, 1978.

Carlson, J., and Winter, R. "The Gillette Sitting Support Orthosis for Non-Ambulatory Children with Severe Cerebral Palsy or Advanced Muscular Dystrophy." Minnesota Medicine, Vol. 61, pp. 469-473. August, 1978.

Carrington, E.G. "A Seating Position for a Cerebral Palsied Child." American Journal of Occupational Therapy, Vol. 32, No. 3, pp. 179-181. March, 1978.

Christopher, Robert P. "Recent Advances in Mechanical Aids in the Management of Children With Brain Damage." Southern Medical Journal, Vol. 67, No. 4, pp. 399-405. April, 1974.

Conger, C. "Modular Plastic Insert for Physically Disabled Children." Proceedings Fourth Annual Conference on Rehabilitation Engineering, Washington, DC, pp. 30-32. 1981.

Cooper, D., and Cousins, S. "A Shapeable Matrix

for Seating Disabled Children." Proceedings 4th Annual Conference on Rehabilitation Engineering, Washington, DC, pp. 27-29. 1981.

Cousins, S., Ackerly, K.E., Jones, K., and Rodwell. Matrix Body Support System. Bioengineering Center, Roehampton, London. 1983.

Cristarella, M.C. "Comparison of Straddling and Sitting Apparatus for the Spastic Cerebral Palsied Child." American Journal of Occupational Therapy, Vol. 29, No. 5, pp. 273-276. May/June, 1975.

Curtis, G.H. et al. "Myelomeningocele, Paraplegia, Quadriplegia and Other Spinal Cord Injuries." The Child With an Orthopedic Disability His Orthotic Needs and How to Meet Them. National Academy of Sciences, Washington, DC. 1973.

Daher, R.L. et al. "Progress Report -- A Complete System for Meeting the Seating Requirements of the Multiply Handicapped." Proceedings, Fourth Annual Conference on Systems and Devices for the Disabled. Seattle, Washington. 1977.

Dicuio, R., and Kugel, R. Into the Light: Helping People with Handicaps at Flower Hospital. New York Medical Publishing Company, New York, NY. 1981.

Donaghue, E.G., et al. "Some Factors Affecting Age of Walking in a Mentally Retarded Population." Developmental Medicine and Child Neurology. Vol. 12, pp. 781-792. 1970.

Dorinson, S.M., Markus, M., and McLaughlin, P. "A Support for Teaching Head Control in Cerebral Palsy." The Physical Therapy Review, Vol. 34, No. 4, pp. 168-170. 1970.

Drummon, D.S., Narechania, M.S., and Breed, A.L. "A Study of Pressure Distributions Measured During Balanced and Unbalanced Sitting." Journal of Bone and Joint Surgery, 64, pp. 1034. 1982.

Dunkel, Ruth, H. and B.S., and Trefler, Elaine, BOT. "Seating for Cerebral Palsied Children -- The Sleek Seat." Physical Therapy, Vol. 57, No. 5, pp. 524-526. May, 1977.

Evachewski, P. "Review of Technical Aids for Handicapped Children Provided by Shriner's Hospital, Winnipeg." Proceedings, Fourth Annual Conference on Systems and Devices for the Disabled, Seattle, WA. 1977.

Farber, Shereen. Sensorimotor Evaluation and Treatment Procedures for Allied Health Personnel, Second edition. Indiana University, Purdue University at Indianapolis Medical Center. 1974.

Finnie, N.R. Handling the Young Cerebral Palsied Child at Home. E.P. Dutton. New York, NY. 1970.

Forbes, M.J. et al. "A Comparison of Three Custom Seating Techniques." Proceedings of International Conference on Rehabilitation Engineering, Canadian Medical and Biological Engineering Society, c/o National Research Council of Canada, Ottawa, Canada. 1980.

Fowles, B. "Evaluation and Selection of Wheelchairs." Physical Therapy Review, Vol. 39, No. 8, pp. 525-529. August, 1959.

Fulford, G. and Brown, J.K. "Position as Cause of Deformity in Children with Cerebral Palsy." Developmental Medicine and Child Neurology, Vol. 18, pp. 305-314. 1976.

Garee, B. An Accent Guide: Wheelchairs and Accessories. Cheever Publishing, Inc. 1981.

Germans, et al. "Vacuum Dilatency Casting for the Construction of Individually Molded Seats." Progress Report No. R.R.4. (Des. B. van Eijsnberger and F.H. Lopes da Silva), Med. Fys. Inst. Tno., Utrecht, pp. 23-29. 1974.

Gilbert, C. "Wheelchair Insert for Hip and Trunk Support for Children with Cerebral Palsy." The Journal of the APTA, Vol. 54, #3. March, 1974.

Green, E.A. and Taylor, R.H. "A Purpose Designed Chair for Severely Handicapped Children." Physiotherapy, Vol. 55, No. 9, pp. 367-377. 1969.

Green, J. et al. Furniture for Handicapped Children; A Report of a Preliminary Study. School of Health Administration and Department of Industrial Arts, University of New South Wales, Sydney, Australia. 1979.

Hardy, S. "The Development of Balance in Sitting and the Influence of Abnormal Patterns of Movement as Found in Cerebral Palsy." Seating for Disabled Children and Adults; Needs and Proposals for Action in Quebec, K. Waksvik, et al., ed. 1980. c/o R. Levy, School of Industrial Design, University of Montreal, Montreal, Quebec.

Harrington, P.R. "The Spine in the Handicapped Child." American Journal of Orthopedics, June and July, 1964. 6, pp. 156-164.

Hayes, D. "The Human Body in the Design of Equipment, Products, and Buildings -- A Model Course." Proceedings of the Fifth Annual Conference on Rehabilitation Engineering (pp. 16). Houston, TX. 1982.

High, E.C. A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages. The Job Development Laboratory, Div. of Rehabilitation Medicine, The George Washington University, Washington, D.C.

Hildreth, K., Horsman, A.A., and Sturtevant, E. Wheelchair Training Protocol. Rhode Island Easter Seal Society, Inc., Meeting Street School, RI. 1982.

Hobson, D.A. "Foam-In-Place Seating for the Severely Disabled." Proceedings of the Fifth Annual Conference on Systems and Devices for the Disabled, Houston, Texas. 1978.

Hobson, D.A. "Special Devices as Aids in the Management of Child Self-Mutilation in the Lesch-Nyhan Syndrome." Pediatrics, Vol. 55, No. 6. 1975.

Hobson, D.A. Spherical Thoracic Supports (STS): A Brief Concept Description and Status Report.

Rehabilitation Engineering Program, University of Tennessee Center for the Health Sciences, Memphis, TN. 1979.

Hobson, D. et al. "The Use of Thermal Plastics in the Design and Fabrication of ADL Devices for Children." Proceedings, Fourth Annual Conference on Systems and Devices for the Disabled. Seattle, WA. 1977.

Hobson, D.A., Heinrich, M.J., and Hanks, S. "Bead Seat Insert Seating System." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 209-211). San Diego, CA. 1983.

Hobson, D.A., Seaton, B.J., and Shapcott, N.G. "Vinyl Vacuum Forming." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 145-147). San Diego, CA. 1983.

Hobson, D. and Tooms, A. "Foam-In-Place Seating System Results of Toxicity Studies." Proceedings, Fourth Annual Conference on Rehabilitation Engineering. RESNA, Bethesda, MD. 1981.

Hofmann, Ruth B. How to Build Special Furniture and Equipment for Handicapped Children. Charles C. Thomas, Springfield, IL. 1970.

Hollings, E.M. and McCay, G. "Adaptations to Wheelchairs." Physiotherapy, Vol. 52, No. 5, pp. 151-154. 1966.

Holt, K.S., Darcos, H. and Lorna, B. H. "Children's Wheelchair Clinic." British Medical Journal, #4, December 16, pp. 651-655. 1972.

Holt, K.S. "Deformity and Disability in Cerebral Palsy." Developmental Medicine and Child Neurology, # 5, pp. 629-631, December, 1963.

Holte, R.N. "A Modular System for Seating the Multiply Handicapped Child." Final Report. Health and Welfare, Canada. National Health Research and Development Program, Ottawa, Canada. 1980.

Holte, R.N. et al. Seating Supplement From Technical Aids for Handicapped Children. Rehabilitation Centre for Children, Winnipeg, Canada. 1977 and 1979.

Holte, R. "The Simple Wheelchair Insert: A Wheelchair Based Seating System for Mildly Involved Cerebral Palsied Children." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 200-202). San Diego, CA. 1983.

Hulme, J.B., Poor, R. Schulein, M., and Pezzino, J. "Perceived Behavior Changes Observed with Adaptive Seating Devices and Training Program for Multihandicapped, Developmentally Disabled Individuals." Physical Therapy, Vol. 63, No. 2. 1983.

"The Joy of Sitting -- Adaptive Seat Helps Handicapped." Southern Research Institute Report. Spring 1981.

Kamenentz, H.L., M.D. The Wheelchair Book. Charles Thomas, Springfield, IL. 1969.

Keegan, J.J. "Alterations of the Lumbar Curve Related to Posture and Seating." The Journal of Bone and Joint Surgery, Vol. 35A, No. 3. July, 1953.

Lee, M., Peznich, D., and Dasso, M. "Wheelchair Prescription." Division of Direct Health Services, US Department of Health, Education and Welfare, Public Health Services. Publication #1666. Supt. of Documents, Washington, DC 20402.

Levy, R., and Waksvik, K. Handout accompanying the presentation. Workshop on Seating for the Cerebral Palsied, University of Tennessee Rehabilitation Engineering Center, 683 Court, Memphis, TN 38163. January and October, 1980.

"Low-Cost Method of Producing Anatomically Shaped Seating for Patients in Wheelchairs." 1980 Annual Report. Orthopedic Research and Locomotion Assessment Unit (ORLAU), Oswestry, Shropshire, England.

May, D. et al. "Individually Customized Postural Support System." Proceedings of International Conference on Rehabilitation Engineering, Canadian Medical and Biological Engineering Society, c/o National Research Council of Canada, Ottawa, Canada. 1980.

Mazzo, M.J., Baez, M.B. Therapeutic Positioning Equipment for the Multiply Handicapped. Patricia Burnett, OTR, 18 S. Landing Road, Rochester, NY 14610. 144 pages. "This book contains the designs and rationale for the pieces of therapeutic positioning equipment which the authors have found to be most beneficial to their resident population. It includes the individual's total needs and abilities in therapeutic programming, recognizing and considering every aspect of normal growth and development."

McGray, R.M. "A Simple Headrest for Patients Confined to a Wheelchair." Journal of Prosthetic Development, 4(3), pp. 347-9. September, 1980.

McKenzie, Mary, W. and Rogers, John E. "Use of Trunk Supports for Severely Paralyzed People." The American Journal of Occupational Therapy, Vol. 27, pp. 147-148. April, 1973.

McQuilton, G. and Johnson, G.R. "Cost Effective Moulded Seating for the Handicapped Child." Prosthetics and Orthotics International, 5, pp. 37-41. 1981.

Montgomery, P., and Gauger, J. "Dynamic Trunk Stabilizer for Children with Cerebral Palsy." Physical Therapy, Vol. 58, No. 4. 1978.

Moore, Sandy et al. "The DESEMO Customized Seating Support - Custom Molded Support for Severely Disabled Persons." Journal of the American Physical Therapy Association, pages 460-463. April, 1982.

Motloch, W.M. "Seating and Positioning for the Physically Impaired." Orthotics and Prosthetics, Vol. 31, No. 2, pp. 11-21. June, 1977.

Nelham, R.L. Seating for Physically Handicapped Children in North America. Churchill Travelling

Fellowship. Rehabilitation Engineering Unit, Chailey Heritage Hospital, Lewes, Sussex, England. 1978.

O'Leary, J.P., Bretz, J.C., Gallo, S. and Thibault, M. "A Rigid Urethane Foam Contour Seat." Proceedings of the International Conference on Rehabilitation Engineering, Washington, DC, pp. 36-39.

O'Reagan, J. and Law, D. "Reusable Casting Technique for Customized Total Contact Seating." Proceedings of International Conference on Rehabilitation Engineering, Canadian Medical and Biological Engineering Society, c/o National Research Council of Canada, Ottawa, Canada. 1980.

O'Rourke, D.A. Technical Aspects of Cerebral Palsy Seating and a Glossary of Seating Terms. Ontario Crippled Children's Centre, Rehabilitation Engineering Department, Toronto, Canada. September, 1979.

Orton, S. "Simplified Wheelchair Measurement Form." Physical Therapy, Vol. 54, No. 2, pp. 149-152. February, 1974.

Paul, I.T. et al. "An Assessment System and Related Modular Components for Seating Handicapped Children." Proceedings, Fifth Annual Conference on Systems and Devices for the Disabled, Houston, TX. 1978.

Paul, I.T. et al. "Factors Influencing the Design of a Modular Insert System for Disabled Children." Proceedings of International Conference on Rehabilitation Engineering, Toronto, 1980. Canadian Medical and Biological Engineering Society, c/o National Research Council of Canada, Ottawa, Canada. 1980.

Paulson, K. "Psychosocial Aspects of Technical Aids." Proceedings of International Conference on Rehabilitation Engineering. Ottawa, Ontario, Canada. 1984.

Pearson, P. and Williams, C., eds. Physical Therapy Services in the Developmental Disabilities. Charles C. Thomas, Springfield, IL. 1972.

Pritham and Leiper. "A Method for Custom Seating of the Severely Disabled." Orthotics and Prosthetics, December, 1981.

Rang, M. et al. "Seating for Children with Cerebral Palsy." Journal of Pediatric Orthopedics, Vol. 1, pp. 279-287. 1981.

Rice, A.L. "Orthotics: The Specialized Wheelchair." Anne Rice, RPT, Flowers Hospital, 1249 Fifth Ave., New York, NY 10029.

Ring, N., Nelham, R., and Pearson, F. "Moulded Supportive Seating for the Disabled." Prosthetics and Orthotics International, 2, pp. 30-34. 1978.

Robertson, G. "Design and Measurement of Training Chairs for the Cerebral Palsied Child." The Physical Therapy Review, Vol. 39, No. 8.

Robinault, I.P. Functional Aids for the Multiply Handicapped. Harper and Row, Hagerstown, MD. 1973.

Samilson, R.L. "Scoliosis in Cerebral Palsy." Instruction Course Syllabus. American Academy of Cerebral Palsy. p. 58. 1971.

Schaezlein, S., and Holte, R. "Side by Side Trials: An Evaluation Methodology for Comparative Testing of Modular Wheelchair Insert System." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 212-214). San Diego, CA. 1983.

Schneider, L.W., Melvin, J.W., and Cooney, C.E. "Impact Sled Test Evaluation of Restraint Systems Used in Transportation of Handicapped Children." SAE Technical Paper #7900 74. February-March, 1979.

Schultz-Hurlburt, B. and Tervo, R. "Wheelchair Users at a Children's Rehabilitation Center: Attributes and Management." Devel. Med. Child Neurology, 24, pp. 54-60. 1982.

Seeger, B.R., and Sutherland, D.A. "Modular Seating for Paralytic Scoliosis: Design and Initial Experience." Prosthetics and Orthotics International, 5, pp. 121-128. 1981.

Seikman, A., and Flanagan, K. "The Anti-thrust Seat: A Wheelchair Insert for Individuals with Abnormal Reflex Patterns or Other Specialized Problems." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 203-208). San Diego, CA. 1983.

Siegel, I., et al. "The Chicago Insert: An Approach to Wheelchair Seating for the Maintenance of Spinal Posture in Duchenne Muscular Dystrophy." Orthotics and Prosthetics, Vol. 33, No. 4. December, 1981.

Silverman, M., and Silverman, O. "The Contour-U Customold Seating System." Proceedings of the Sixth Annual Conference on Rehabilitation Engineering (pp. 194-196). San Diego, CA. 1983.

Slominski, A. and Hament, C. "Occupational Therapy for Cerebral Palsy." Occupational Therapy. Willar, H. and Spackman, C., eds. 4th edition. J.B. Lippincott, Philadelphia, PA. 1971.

Sperryn, P.N. "Two Years in a Wheelchair Clinic." Rheumatology and Rehabilitation, Vol. 13, No. 4, pp. 184-189. November, 1974.

Spiegler, J., and Goldberg, M. "The Wheelchair as a Permanent Mode of Mobility. A Detailed Guide to Prescription Part 1." American Journal of Physical Medicine, Vol. 47, No. 6. 1968.

Taylor, P.M. and Bardsley, G.I. Construction of the Assessment Chair at Dundee Limb Fitting Centre (Design Report). Dundee Limb Fitting Centre, Dundee, Scotland. 1982.

Tooms, R.E. and Hobson, D.A. Preliminary Report on Foam-in-Place Seating for the Severely Disabled. Rehabilitation Engineering Program, University of Tennessee Center for the Health

19

Sciences, Memphis, TN. 1981.

Trefler, E. "Arm Restraints During Functional Activities." American Journal of Occupational Therapy, Vol. 36, No. 9. 1982.

Trefler, E., et al. "Seating for Cerebral Palsied Children." Inter-Clinic Information Bulletin, Vol. 17, No. 1, pp. 1-8. 1978.

Trefler, E., et al. Seating for Children with Cerebral Palsy: A Manual. Rehabilitation Engineering Program, University of Tennessee, Memphis, TN. 1984.

Trefler, E., and Cook, H. "Powered Mobility for Children." Proceedings of the International Conference on Rehabilitation Engineering (pp. 113-116). Toronto, Ontario, Canada. 1980.

Trefler, E., OTR, Hawks, S., Huggins, P., Chiarrizzo, S. and Hobson, D. "A Modular Seating System for Cerebral Palsied Children." Developmental Medicine and Child Neurology, Vol. 29, No. 2, pp. 199-204. April, 1978.

Trefler, E., Nickey, J., and Hobson, D. "Technology in the Education of Multiply Handicapped Children." American Journal of Occupational Therapy, Vol. 37, No. 6, pp. 381-387. 1983.

Tumble Forms Manual. J.A. Preston Corp., 71 Fifth Avenue, New York, NY. 1980.

Verburg, G., Snell, E., Pilkington, M., and Milner, M. "Effects of Powered Mobility on Young Handicapped Children and Their Families." Proceedings of the Second International Conference on Rehabilitation Engineering. Ottawa, Ontario, Canada. 1984.

Von Kampen, E., and Holte, R. "The Cozy Seat." Proceedings of the International Conference on Rehabilitation Engineering (pp. 156-159). Toronto, Ontario, Canada. 1980.

Von Werssowetz, O., and Parker, I. "Flexion Insert for Wheelchairs." American Journal of Occupational Therapy, 15, pp. 210-211. 1961.

Waksvik, K. and Levy, R. "An Approach to Seating for the Cerebral Palsied." Canadian Journal of Occupational Therapy, Vol. 46, No. 4, pp. 147-153.

Waksvik, K., Levy, R., Churcher, E., and Breault, D., eds. Seating for Disabled Children and Adults: Needs and Proposals for Action in Quebec. Universite de Montreal, 3544 de Bullion, Montreal, Quebec H2X 2Z9 CANADA. March, 1980.

Ward, D.E. Positioning the Handicapped Child for Function: A Guide to Evaluate and Prescribe Equipment for the Child with Central Nervous System Dysfunction. D. Ward, St. Louis, Missouri. 1983.

Warren, C.G., et al. "Reducing Back Displacement in the Powered Reclining Wheelchair." Archives of Physical Medicine and Rehabilitation, Vol. 63. September, 1982.

Wat, L. "Mobility Module Counteracting the Tonic Labyrinthine Reflex in a Cerebral Palsied Child." Physical Therapy, Vol. 58, No. 7, pp. 880-881. 1978.

Wesbeach, A., et al. "Children in Wheelchairs." British Medical Journal, 19 281 (6234), pp. 199-201. 1980.

Wesely, L.D., Coss, R.L., and Kniffen, E. "Wheelchair Insert for Severely Handicapped Children." Physical Therapy, Vol. 58, No. 7, pp. 879-880. 1978.

Wilshere, E.R. Equipment for the Disabled Series. Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB, ENGLAND. 1980.

AUDIOVISUALS

Choose Them Chairfully -- Adaptive Chairs for Handicapped Children. Media Resource Center, Meyer Children's Rehabilitation Institute, University of Nebraska Medical Center, 444 South 44th Street, Omaha, NE 68131. slide/tape, color, 13 minutes. 1979. Presents a variety of specially adapted chairs, ranging from those that can be purchased to those that are easily adapted from other household chairs or ordinary building materials. Although the chairs discussed are best suited for children with cerebral palsy, many can accommodate children with any neuromuscular or other handicapping condition.

Evaluating the Environment: A Key to Function. Bergen and Colangelo. Everest & Jennings, 3233 E Mission Oaks Blvd., Camarillo, CA 93010, 805/987-8911. Call your Everest & Jennings representative for a free screening at your facility. Facility screenings include information booklets.

Handling and Positioning of the Child with Central Nervous System Dysfunction. Bergan, Colangelo, and Gottlieb. Blythedale Children's Hospital, Valhalla, NY. Slide/tape. 1977.

Positioning: Maximizing Form to Maximize Function. Trefler, Hallenborg, and Gans. Everest & Jennings, 3233 E. Mission Oaks Blvd., Camarillo, CA 93010, 805/987-8911. Call your Everest & Jennings representative for a free screening at your facility. Facility screenings include information booklets.

Positioning and Adaptive Equipment with CNS Deficit. Educational Media, Blythedale Children's Hospital, Valhalla, NY 10595. Slide/cassette. 1976.

Power Wheelchairs: When, How, Why. Bennethum, Butler, and Harris. Everest & Jennings, 3233 E. Mission Oaks Blvd., Camarillo, CA 93010, 805/987-8911. Call your Everest & Jennings representative for a free screening at your facility. Facility screenings include information booklets.

Special Magic. Equipment for Handicapped Children. University of Tennessee Rehabilitation Engineering Program, 682 Court, Memphis, TN 38163. Rental $25.00.

Wheels. University of Kansas, Bureau of Child Research. Available from University of Kansas, Film Rental Service, 746 Massachusetts Street, Lawrence KS 66044. 16 mm, color, 13 minutes. 1974. Demonstrates how the wheelchair modification team, working with a physician, reconstructs and modifies standard wheelchairs to meet the needs of multiply handicapped children. The chair serves as transportation and has prosthetic and therapeutic purposes.

PERSONAL VEHICLES

INTRODUCTION

"One of life's activities often affected by motor or sensory impairment is the ability to operate a motor vehicle. Due to the resulting lack of mobility, persons with disabilities are often deprived of meaningful vocational opportunities, participation in community and cultural events, and recreational activities. Being able to drive offers the homebound person independence and greater self-sufficiency. However, if these potential drivers are to operate their vehicles safely, not only is adequate equipment necessary but also proper training.

"Much attention is now focused on mass transit for handicapped persons and on various para-transit and taxi transportation schemes. However, these alternatives only partially meet the transportation needs of disabled people. In addition, they need a convenient and economical means of getting to work and performing the many functions associated with daily living. A practical solution is to have many of these disabled persons operate motor vehicles independently.

"Some of the difficulty encountered by disabled drivers can be overcome by providing information on opportunities already available. For example:

- Selecting the type of vehicle most appropriate for their functioning capabilities;
- Purchasing the most appropriate options and adaptive devices;
- Arranging for installation of special devices;
- Locating training facilities;
- Evaluating driving tasks;
- Employing appropriate operating procedures;
- Assuring proper maintenance of equipment, particularly adaptive equipment; and
- Taking precautions against problems encountered outside the car."

Rehab Brief, June 25, 1980

HINTS ON OPERATING A SUCCESSFUL DRIVER EDUCATION PROGRAM

In general, the driver educational program for the physically disabled student follows the same steps and procedures as the one for the able-bodied student. However, equipment and methodology must be tailored to the student's functional capabilities.

Be patient, let the students do things for themselves in a safe and confidence-building environment. They must become independent.

Try to know as much about the students and their functional capabilities as possible.

Be consistent -- keep your commands simple and consistent throughout the training period.

Keep in mind, to handicapped students driving is not a luxury, it is often a necessity.

Do not assume students can do something because others with similar disabilities can. Each student is an individual.

You, as the instructor, must be fully acquainted with and able to operate all the assistive devices. It will make you a better teacher.

Always check all assistive devices before you begin a lesson.

Learn how to handle a wheelchair.

Be firm - disabled students must be able to control the vehicle with the same efficiency and safety as able-bodied students.

Try not to recommend more assistive devices than necessary.

Encourage the students to be totally independent -- they must do everything without your help.

Ask the students for their recommendations and comments -- after all, they are doing the driving.

Try to be available when your students purchase cars. Make suggestions and recommendations based on their capabilities and needs.

Know all about the different disabilities you will encounter and the functional limitations they impose. Apply the knowledge in relation to the driving task.

Good Luck -- you've entered a very important and rewarding career. Remember, "mobility is the final step in total rehabilitation of the disabled individual." You have opened a whole new world to your students by providing them with mobility.

197

What is ADED?

ADED is an association of professionals interested in driver education for disabled people; -- professionals who want to stay current in a rapidly changing field; -- people who get involved.

Who benefits from ADED membership?

ADED members represent a cross-section of professionals from various parts of our country. Some of the groups interested in and directly affected by ADED members' activities include:

Medical community
Rehabilitation community
Educational community:
local and national
high school and college
guidance councelors, special educators, driver educators, administrators

Engineers

Equipment designers, manufacturers, and vendors

Government agencies.
Vocational rehabilitation personnel
motor vehicle licensing personnel
legislators

Enforcement agencies
Insurance industry
Individuals, companies, and associations with an interest in SAFETY
general population

What are the advantages of ADED membership?

Basically ADED offers an opportunity for professional growth by . . .

1. Facilitating an exchange of ideas between members.
   a. Sharing research and innovations in adaptive equipment.
   b. Sharing methods of evaluation.
   c. Sharing teaching techniques.
2. Publishing "The ADED Newsletter".
3. Referring resource people to present workshops or courses on disabled driver education and related subjects.
4. Maintaining a library for members' use.
5. Sharing a common interest and therefore an opportunity for unique professional friendships.
6. Surveying the membership to provide information on program development, program improvement, and national trends.
7. Holding a yearly conference.

The benefits of the association are many and the cost is small, so you are invited to join ADED by filling out and sending in the attached membership application along with your dues of only $25.00

ASSOCIATION OF DRIVER EDUCATORS FOR THE DISABLED - ADED

ADED Membership Form

INDIVIDUAL MEMBERSHIP -- $25.00
(Membership Expires DEC.31)
Corporate Membership - $50.00

To join, please complete the below listed items in full and mail, with your check (payable to ADED) to:

A.D.E.D. SECRETARIAT
UNIVERSITY OF MICHIGAN
REHAB ENGINEERING CENTER
208 LAY AUTOMOTIVE LAB
ANN ARBOR, MICH 48109

Name _____
(Please print or type)

Affiliate Organization _____

_____

Address _____

_____

_____

Phone ( ) _____
A C

Position or Title _____

_____

Brief Description of Your Duties

_____

_____

_____

_____

_____

_____

Reprinted with permission of:
COLORADO DRIVING SCHOOL, INC.
P.O. BOX 393 ENGLEWOOD, CO 80151 (303) 781-8506

Name: _____ Date(s) _____
(Last) (First) Total hours of instruction _____ Date of driving release: _____

Address: _____ Phone _____

Special information: (directions or equipment) _____

License/permit No. _____ State _____ Expiration date _____

Restrictions _____ Birth date _____ Instructor _____

Referred by: _____ Reports to: _____

KEY:
V - evaluated and sucessfully completed ★ - Key point of evaluation
O - problem area (explanation) NA - Not applicable/not evaluated

DRIVING SKILLS EVALUATION

_____ I. Residential area
- _____ A. Entering & exiting the vehicle
- _____ B. Miscellaneous controls operation
- _____ C. Physical limitations
- _____ D. Attitude
- _____ E. Perceptual skills
- _____ F. Equipment operation
- _____ G. Straight driving
- _____ H. Stopping
- _____ I. Corners
- _____ J. Backing
- _____ K. Parking

_____ II. Light Traffic
- _____ A. Straight driving
- _____ B. Lane changing
- _____ C. Corners
- _____ D. Defensive driving
- _____ E. Observation habits

_____ III. Highway driving
- _____ A. Entering
- _____ B. Lane control
- _____ C. Speed control
- _____ D. Passing
- _____ E. Exiting highway

_____ IV. Advanced driving
- _____ A. Heavy traffic driving
- _____ B. Mountain driving
- _____ C. Night driving
- _____ D. Adverse weather driving

_____ V. Areas of Discussion
- _____ A. Emergency driving situations
- _____ B. Medical considerations
- _____ C. Adaptive equipment failure
- _____ D. Vehicle maintenance
- _____ E. Licensing requirements
- _____ F. Insurance requirements

TRAINING RECOMMENDATION:

_____ Proceed to licensing
_____ Independent driving without adaptive equipment
_____ Independent driving with required adaptive equipment (see equipment recommendations)
_____ Further evaluation necessary
Time suggestion
Reason

_____ Driving restrictions recommendations
Explain
_____ Terminate from driving program
Reason

GENERAL COMMENTS:

EQUIPMENT RECOMMENDATION

_____ Driving a van (see attached sheet)
_____ Driving a car

_____ A. Vehicle limitations
- _____ 1. None
- _____ 2. Power steering, power brakes, automatic transmission, 2 door, air conditioning
- _____ 3. Other

_____ B. Hand controls
- _____ 1. Right side mount
- _____ 2. Left side mount
- _____ 3. Paraplegic style (with horn button, and dimmer switch)
- _____ 4. Quadriplegic style (with horn button, dimmer button, and wrist rest)
- _____ 5. Other

_____ C. Steering device
- _____ 1. None
- _____ 2. Steering knob
- _____ 3. Tri-pin
- _____ 4. Position notation
- _____ 5. Other

_____ D. Safety features
- _____ 1. Park brake extension
- _____ 2. Upper body belt for balance
- _____ 3. CB radio
- _____ 4. Right and left outside mirrors
- _____ 5. Other

_____ E. Other accessories
- _____ 1. Left foot gas pedal
- _____ 2. Left hand shift lever extension
- _____ 3. Right hand turn signal lever
- _____ 4. Headlight dimmer switch
  location
- _____ 5. Horn button
  location
- _____ 6. 6 way power seat
- _____ 7. Other

Reprinted with permission of:

Colorado Driving School

Limited Evaluation

Name: Date(s)_____

Address: Total Evaluation Time_____

Evaluator:

Referred By:

Evaluation Limitation: _____ stationary
_____ parking lot
_____ limited time
_____ other:

Reports to: Student: _____
Referring agent: _____
Funding sourse: _____
Other: _____

Paperwork: Pre-Driving information sheet _____
Prescription _____
Contract _____
Evaluation Completed _____
Billing _____

DRIVING EVALUATION PROCEDURE:

EVALUATION RECOMMENDATION:

_____Proceed to licensing
_____Independent driving without adaptive equipment
_____Independent driving with required adaptive equipment (see equipment recommendations)
_____Further evaluation necessary
Reason:

Time suggestion:

_____Driving restrictions recommendations
Explain:

_____Terminate from driving program
Reason:

EQUIPMENT RECOMMENDATION

_____Driving a van (see attached sheet)
_____Driving a car

_____A. Vehicle limitations
_____1. None
_____2. Power steering, power brakes, automatic transmission, 2-door, air conditioning
_____3. Other:

_____B. Hand controls
_____1. Right side mount
_____2. Left side mount
_____3. Paraplegic style (with horn button, and dimmer switch)
_____4. Quadriplegic style (with horn button, dimmer button, and wrist rest)

_____C. Steering device
_____1. None
_____2. Steering knob
_____3. Tri-pin
_____4. Position notation:
_____5. Other:

_____D. Safety features
_____1. Park brake extension
_____2. Upper body belt for balance
_____3. CB radio
_____4. Right and left outside mirrors
_____5. Other:

_____E. Other accessories
_____1. Left foot gas pedal
_____2. Left hand shift lever extension
_____3. Righ hand turn signal lever
_____4. Headlight dimmer swith location:
_____5. Horn button location:
_____6. 6-way power seat
_____7. Other:

Reprinted with permission of:
Colorado Driving School

PRE-DRIVING EVALUATION

Name: _____ Refered by _____
Date of Birth: _____ Age: _____ License/Permit # _____
State: _____ Restrictions: _____ Evaluation Date: _____
Disability: _____ Caused by: _____ Date of Onset: _____
Present Dominance: _____ Pre-Onset Dominance: _____
Past Driving Experience: Driver Education Plan:

Pre-Onset Driving Record:

Need for Driving:

MOTOR STATUS

I. Upper extremity function
A. Muscle picture
_____ bilateral function
_____ unilateral function
_____ right
_____ left
Comments (how affects function)

B. Strength
_____ WNL
_____ right
_____ left
_____ functional limitations
_____ shoulder
_____ elbow
_____ wrist
_____ hand
right left
Comments: (how affects function)

C. Range of motion
_____ WNL
_____ right
_____ left
_____ functional limitation
_____ shoulder
_____ elbow
_____ wrist
_____ hand
right left
Comments: (how affects function)

D. Sensory
_____ WNL
_____ right
_____ left
_____ functional limitation
_____ right
_____ left
Comments: (1. type of impairment: position sense, pain, touch, etc. 2. how affects function)

II. Lower extremity function
A. Muscle picture
_____ bilateral function
_____ unilateral function
_____ right
_____ left
Comments: (how affects function)

B. Strength
_____ WNL
_____ right
_____ left
_____ functional limitations
_____ hip
_____ knee
_____ ankle
right left
Comments: (how affects function)

C. Range of motion
_____ WNL
_____ right
_____ left
_____ functional limitation
_____ hip
_____ knee
_____ ankle
right left
Comments: (how affects function)

D. Sensory
WNL
_____ right
_____ left
_____ functional limitation
_____ right
_____ left
Comments: (1. Type of impairment: position sense, pain, touch, etc. 2. how affects function)

MOTOR STATUS

I. Upper extremity function
E. Reflex patterns
_____ present
_____ absent
Comments: (1. type of impairment 2. how affects function)

F. Coordination
_____ no functional limitations
_____ slowed response
_____ tremors
_____ spasticity
right left
Comments: (how affects function)

G. Reaction time
_____ Normal
_____ Slowed
right left
Comments: (how affects function)

I. Balance
_____ WNL
_____ functional limitation
Comments: (how affects function)

J. Equipment (indicate R or L)
_____ sling
_____ handsplint
_____ other (describe)
Comments: (how affects function)

II. AdL Evaluation
(Describe typical problems that may affect driving)
_____ ADL dependent on attendant
_____ ADL independent
_____ family attitudes
_____ alternative transportation accessibility
_____ types of mods necessary for independent driving
_____ availability of money for equipment and vehicle
Comments: (comment completely in each area)

II. Lower extremity function
E. Reflex patterns
_____ present
_____ absent
Comments: (1. type of impairment 2. how affects function)

F. Coordination
_____ no functional limitations
_____ slowed response
_____ tremors
_____ spasticity
right left
Comments: (how affects function)

G. Reaction time
_____ normal
_____ slowed
right left
Comments: (how affects function)

H. Endurance
_____ normal
_____ decreased
Comments (how affects function)

I. Mobility
_____ transfers
independent
assistance required
describe:
walking
independent
assistance required
describe
Comments: (how affects function)

J. Equipment (indicate R or L)
wheelchair
full leg brace
cane/walking aid
short leg brace
other (describe)
Comments: (how affects function)

Reprinted with permission of:
Colorado Driving School
P.O. BOX 393
Englewood, Colorado 80151

EQUIPMENT RECOMMENDATIONS

Driving A Van

Name:

Date:

Evaluator:

Original Vehicle Equipment: Power steering, power brakes, automatic transmission, air conditioning, large outside mirrors, ¾ ton, heavy duty cooling, heavy duty alternator

Vehicle Modifications:

_____A. Hand controls
- _____1. Right side mount
- _____2. Left side mount
- _____3. Paraplegic style (with horn button and dimmer switch)
- _____4. Quadriplegic style (with wrist rest, horn button and dimmer button
- _____5. Lever type (push-pull)
- _____6. Brake bracket to mount the hand controls
- _____7. Other:

_____B. Steering device
- _____1. Steering knob
- _____2. Tri-pin
- _____3. Position notation:
- _____4. Other:

_____C. Fully automatic lift
- _____1. Door actuators
- _____2. Outside access door for switches
- _____3. Position notation:
- _____4. Other:

_____D. Vehicle body modifications
- _____1. Raised roof (17" or 24")
- _____2. Raised doors (57")
- _____3. Vehicle body stabilizers
- _____4. Heavy duty suspension
- _____5. Smooth floor
- _____6. Other

_____E. Steering wheel modifications
- _____1. Extended steering column length notation:
- _____2. Tilting/telescoping steering
- _____3. Steering wheel size variance explain:
- _____4. Sensitized steering
- _____5. Other:

_____F. Steering wheel access modifications
- _____1. Swivel-base driver's seat
- _____2. Power seat base for driver's seat
- _____3. Floor channels
  - _____a. 2" standard
  - _____b. 5" electric
- _____4. Elevator floor
- _____5. Quick release alternate driver's seat
- _____6. Other

_____G. Control modifications
- _____1. Relocate ignition switch
- _____2. Transmission selector extension
- _____3. Turn signal extension
- _____4. Dash mounted control extensions
  Special notations:
- _____5. Power windows
- _____6. Power door lock
- _____7. Elbow turn signal, horn, and wiper controls
- _____8. Control console
- _____9. Electric emergency brake
- _____10. Emergency brake switch
- _____11. Other:

_____H. Safety features
- _____1. Upper body belt for balance
  - _____a. To wheelchair
  - _____b. Shoulder belts-underarm support
- _____2. Electric lockdown for driver's wheelchair
- _____3. Manual lockdown for passenger's wheelchair
- _____4. Dual battery system
- _____5. CB radio
- _____6. Orthodic device explain:
- _____7. Other:

CAR SELECTION AND PURCHASE

Reproduced with permission from: Teaching Driver Education to the Physically Disabled. Human Resources Center, Albertson, New York.

General Requirements

The automobile to be utilized by the disabled driver may include all or some of the following factory equipment in addition to the hand controls and assistive devices that must be installed to compensate for functional limitations.

1) 8 Cylinder Car - to accommodate all the power devices.

2) 2-Door Sedan - to permit easier entry of wheelchair to car.

3) Automatic Transmission - to reduce vehicle operation efforts.

4) Power Steering - to facilitate one hand steering for individuals with upper extremity weakness.

5) Power Brakes - to facilitate braking by use of hand controls for individuals with limited ranges of motion and/or concurrent weakness.

6) Power Windows - to permit individuals who lack hand and wrist dexterity to pay tolls, ask directions, etc.

7) 6-way Power Seat - to aid in transfer and seating position adjustments, as well as to compensate for some functional limitations.

8) Air Conditioning - to assist individuals with low respiratory levels and those who have skin problems.

9) Bench Seat (Vinyl) - to allow for ease and safety while transferring.

10) Tilt Steering Wheel - to facilitate steering for individuals utilizing a quad cuff and to allow for ease of transfer by the disabled individual. A telescopic steering wheel can also be helpful in certain disabilities.

11) Power Door Locks - to permit the disabled individual to unlock and lock the doors independently.

12) Fold-down Arm Rest - to aid in hip stability for certain disabilities.

13) Inside Adjustable Side View Mirror - to enable the disabled individual to operate right and left side view mirrors. If there is an absence of a functional grip or finger dexterity, a toggle switch is recommended for ease of operation.

14) CB Radio - to assist the disabled individual in case of vehicle breakdown and when there is a need for emergency assistance.

15) Rear Window Defroster - mandatory on all cars since 1978.

16) Cruise Control - to reduce the fatigue when driving for long distances on highways.

17) Available Space - to permit transfer of the wheelchair into the back seat of the car. Available space for the wheelchair and the height of the car floor from the ground should be measured to determine if the disabled individual has sufficient strength to pull the wheelchair into the car.

Car Purchase:

Car purchase should be done with much attention to ensure that the disabled individual will have the functional capabilities to drive the particular car he or she wishes to buy. Items that should be investigated are cost, steering effort required, braking effort required, available space for wheelchair, height of stepwell, visibility, accessibility of dashboard controls, efficiency and reliability of vehicle (as the disabled individual cannot afford a breakdown), and insurance rates.

Car purchase is extremely difficult for individuals who utilize hand controls and assistive devices because they cannot test-drive the vehicle but rather must rely on the judgment of others.

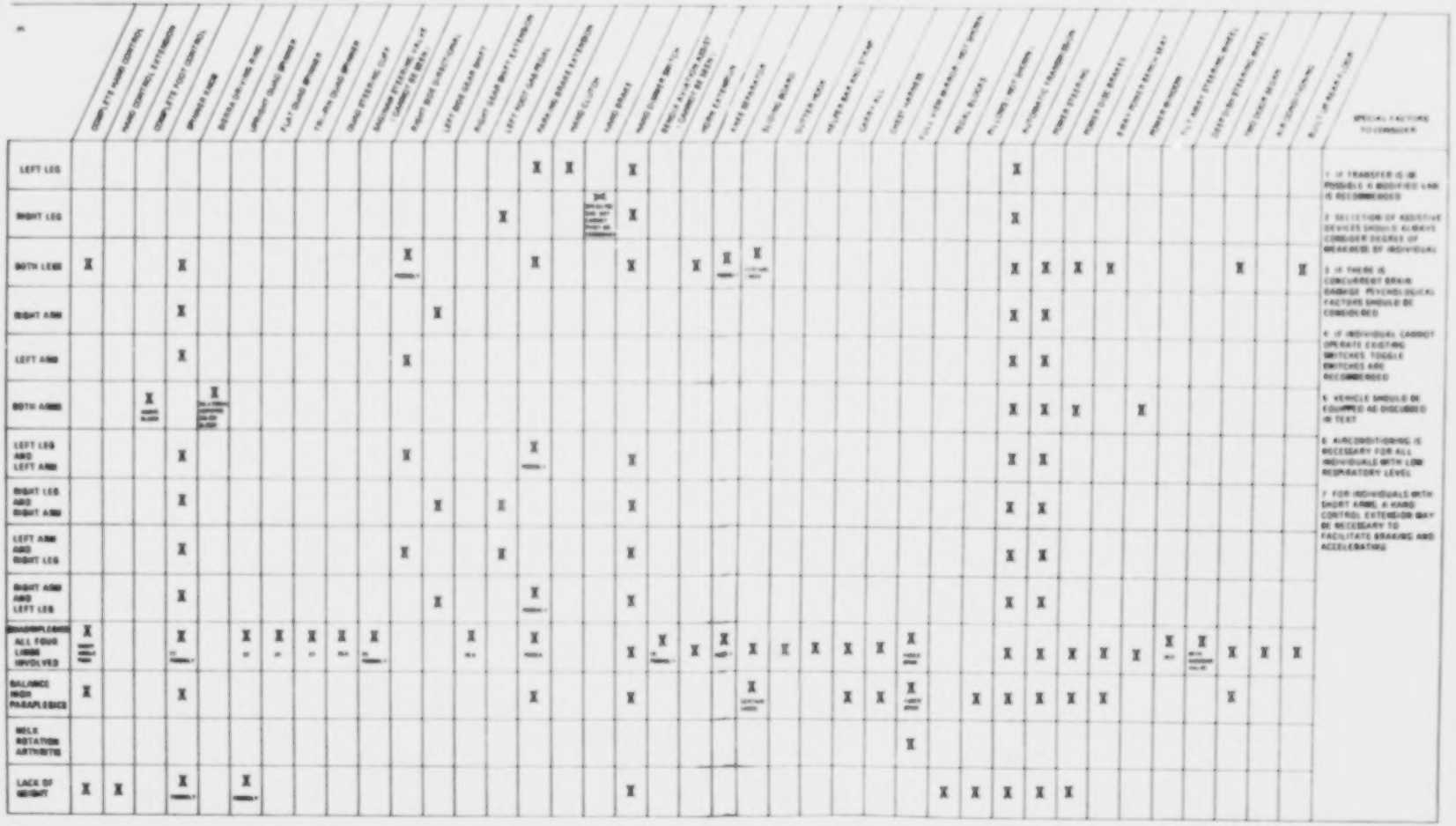
Not all the vehicle requirements mentioned are necessary for all disabled drivers. Decisions as to what is needed depend on functional limitations and capabilities. The driver educator must impress upon the disabled trainee the importance of regular car maintenance and checkups in order to minimize the chance of failure of any kind. Tires, engine, hand controls and assistive devices should be maintained in as nearly perfect conditions as possible.

After the proper vehicle has been selected, optimal assistive devices should be installed to compensate for functional limitations. They should be safe and provide the most efficient compensation for functional limitations. It is important that these assistive devices be installed so that they do not interfere with the able-bodied driver when operating the vehicle.

For names and addresses of manufacturers of adapted driving aids, contact the ABLEDATA system.

Reprinted with permission from Hand Controls and Assistive Devices for the Physically Disabled Driver, Human Resources Center Albertson, New York

GUIDE TO THE USE OF HAND CONTROLS AND ASSISTIVE DEVICES


LEFT LEG
RIGHT LEG
BOTH LEGS
RIGHT ARM
LEFT ARM
BOTH ARMS
LEFT LEG AND LEFT ARM
RIGHT LEG AND RIGHT ARM
LEFT ARM AND RIGHT LEG
RIGHT ARM AND LEFT LEG
PARAPLEGIA/QUADRIPLEGIA ALL FOUR LIMBS INVOLVED
BALANCE NON PARAPLEGICS
MILD ROTATION ARTHRITIS
LACK OF HEIGHT
SPECIAL FACTORS TO CONSIDER
1. IF TRANSFER IS IMPOSSIBLE A MODIFIED VAN IS RECOMMENDED
2. SELECTION OF ASSISTIVE DEVICES SHOULD ALWAYS CONSIDER DEGREE OF DISABILITY OF INDIVIDUAL
3. IF THERE IS CONCURRENT BRAIN DAMAGE PSYCHOLOGICAL FACTORS SHOULD BE CONSIDERED
4. IF INDIVIDUAL CANNOT OPERATE EXISTING SWITCHES TOGGLE SWITCHES ARE RECOMMENDED
5. VEHICLE SHOULD BE EQUIPPED AS DISCUSSED IN TEXT
6. AIRCONDITIONING IS NECESSARY FOR ALL INDIVIDUALS WITH LOW RESPIRATORY LEVEL
7. FOR INDIVIDUALS WITH SHORT ARMS, A HAND CONTROL EXTENSION MAY BE NECESSARY TO FACILITATE BRAKING AND ACCELERATING

RESOURCES: PERSONAL VEHICLES

PUBLICATIONS

Driver Education: Curriculum Guide for the Physically Handicapped. Des Moines Public Schools, 1800 Grand Avenue, Des Moines, IA 50307.

Driver Education for the Handicapped: A Driving Guide for Behind the Wheel Instruction. David G. Kraemer. Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, Wisconsin 54751. Rev. ed. 1980. 63 pages, figs. Spiral bound. $3.50. A driver training educational program field tested with persons having various disabi lities. Including instructional forms, 16 struc tured lessons, guidelines for teaching, glossary of medical terms, and list of manufacturers of special automotive equipment.

Driver Education for the Severely Physically Disabled: Equipment and Adapted Methodologies for Teaching in a Fully Modified Van. Human Resources Center, Albertson, New York 11507. This instructional manual describes the special equipment and adapted methodologies used to teach severely disabled individuals to drive a van independently. The manual offers useful training techniques and illustrates many adapted devices for the severely physically disabled person.

Driving for the Physically Handicapped: Proceedings of a National Symposium 1981. Education and Training Center, Rehabilitation Institute of Chicago, 345 E. Superior Street, Chicago, IL 60611. $10.00.

"Driving Systems for Independent Mobility." ADL, Inc., 6 Hurlow Court, Rockville, Maryland 20850. Attn.: Elise Brown. $2.50.

Evaluating Driving Potential of Persons with Physical Disabilities. Menahem Less, Edward C. Colverd, Gerald E. DeMauro, and Judy Young. Human Resources Center, Albertson, New York 11507. 1978. 36 pages. Evaluation of potential must be the starting point in any driver education program designed for the physically disabled. The program must be adapted to the needs of each student. This manual brings together assessment expertise in the areas of driver education and muscle testing. It presents contributions of experts and resources in both these fields as well as the experiences of the Human Resources Center adaptive driver education program. Particular attention is given to those muscle movements that are most directly involved in driving.

The evaluation process, which is described here, is divided into two main areas: functional and in-car. Both are concerned with strength, range of motion, coordination, reach, and speed and reaction time of those muscles involved in driving. The functional test is an in-depth evaluation of the general performance of the muscles, while the in-car evaluation assesses muscle performance specific to driving. The use of these tests provides the basis for determining whether the disabled individual can drive and for recommending assistive devices.

Going Places in Your Own Vehicle. Betty Garee, editor. Accent Special Publications, P.O. Box 700, Bloomington, Illinois 61701. 1982. 65 pages. $7.15.

Guide for Physicians in Determining Fitness to Drive a Motor Vehicle, revised 1981. The Canadian Medical Association, 1867 Alta Vista Drive, Ottawa, Ontario, CANADA K1G OG8.

Hand Controls and Assistive Devices for the Physically Disabled Driver. Menahem Less, et al. Human Resources Center, Albertson, NY 11507. 1981. 52 p. This manual includes a practical evaluation of functional disabilities, a summary of hand controls, assistive devices and modified vans, and a guide to the use of hand controls and assistive devices.

The Handicapped Driver's Mobility Guide, 3rd edition. Traffic Engineering and Safety Department, American Automobile Association, Falls Church, VA 22047. 1981. 75 pp. Contact your local AAA club regarding the availability of this publication. Information on equipment, selection, training, and a national license plate - blue curb law survey. Contains a 54 page state by state annotated list of organizations providing services such as driver training, evaluation, van modification.

A Manual on the Driver Training Programme for the Physically Handicapped. Glenrose Hospital, 10230 11th Avenue, Edmonton, Alberta T5G 0B7, Canada.

Outdoor Transport (4th edition). E.R. Wilshire. Equipment for the Disabled Series. Oxford Regional Health Authority, 2 Foredown Drive, Portslade, Brighton, BN4 2BB, ENGLAND. Lists and describes, with photographs, transportation and outdoor accessibility equipment for disabled persons. Covers categories such as children's mobility aids, outdoor wheelchairs, cars and car accessories, van conversions, harnesses, garages and ramps. Includes reference and resource lists.

Physician's Guide for Determining Driver Limita tion. American Medical Association, 535 N. Dearborn, Chicago, IL 60610.

Perceptual Cognitive Skills and Driving: Effects of Brain Damage. University of Michigan, Rehab Engineering Center, Highway Safety Research Institute, Ann Arbor, Michigan 48109. January 1980.

"Physically Disabled Driver." Rehab Brief, Volume III, No. 9, June 25, 1980. National Institute of Handicapped Research, Office of Special Education and Rehabilitative Services, Department of Education, Washington, DC 20201.

Preliminary Testing of Techniques to Improve Driving Performance of Persons with Brain Damage via Perceptual/Cognitive Training. Sivak, Hill, Olsen, Henson. University of Michigan, Rehab Engineering Center, Highway Safety Research Institute, Ann Arbor, Michigan 48109.

Teaching Driver Education to the Disabled. Teaching Driver Education to the Hearing Impaired.

Memphis City School, 2687 Avery, Memphis, TN 38112.

Teaching Driver Education to the Physically Disabled. Menahem Less et al. Human Resources Center, Albertson, NY 11507. 1978. 64 pages. $5.00. The driver education instructor will find in this manual the information necessary to provide an efficient driver training program for physically disabled students. The adapted teaching methodology presented here provides detailed information on special driving techniques for the disabled, including the use of driving aids in training, functions of hand controls and assistive devices, transfer methods, use of simulators, use of vans, and preparation for the road test.

Teaching the Handicapped to Drive - Resource Manual. Marvin Mills, principal author, editor. Murray State University Printing Services, Murray, Kentucky. 1980.

Teacher's Preparation Course in Driver Education for the Physically Disabled. A Sample Course. Edward Colverd, et al. Human Resources Center, Albertson, New York. 1978. 40 pp. $4.25. This is a course outline for teaching driver educators the art of teaching adapted driver education. It presents lesson plans to provide guidelines and suggests a general sequence of progress for the knowledgeable instructor.

The manual also includes listings of available training films, manufacturers of hand and foot controls and assistive devices, companies that specialize in van modifications, as well as a bibliography, a sample final examination, and a course evaluation form.

SELECTED ARTICLES

Andrews, Paul, Erickson, John, Vision Beyond Compare, Paraplegic News-November 1979.

Bardach, Joan, Ph.D., Psychological Factors in the Handicapped Driver Archives of Phys. Med. & Rehab. Vol. 52 July 1971.

Clack, T.D., Olsen, D.J., The Hearing Handicapped in Automobile Operations, Kresge Hearing Institute, University of Michigan Medical School, Ann Arbor, Michigan 48109.

Gurgold, Gary, Harden, David, Assessing the Driving Potential of the Handicapped American Journal of Occupational Therapy - January 1978.

Handicapped Drivers Education and Training. American Rehabilitation, Jan/Feb 1982.

Jacobs, Stanley, M.D. Reporting the Handicapped Driver Archives of Phys. Med. & Rehab. Vol. 59 August 1978.

Kent, Herbert, M.D., et al, A Driver Training Program for the Disabled Archives Phys. Med. Vol. 60 June 1979.

Kopsa, Rodger, M.A. McDermott, Make, Jr., Ph.D., Handicapped Driver Controls Operability: A Device for Clinical Evaluation of Patients, Archives of Phys. Med. & Rehab. Vol. 59 May 1978.

Mittlemann, Michael, M.D., Greenfield, Walter, Jr. The Handicapped Driver: An Insurer's Point of View Archives of Phys. Med. August 1977 Vol. 58.

Negri, Barry, Ibison, Richard, Ph.D., Accidents Involving Handicapped Drivers Rehab. Literature May - June 1979 Vol. 40.

Reger, S.I., et al. Aid for Training and Evaluation of Handicapped Drivers. Bulletin of Prosthetics Research, Fall 1981 Government Printing Office, Washington, D.C. 051-000-00157-5

Risk, Harold, M.S. Driving Control and Equipment for a Quadruple Amputee Patient, Archives Phys. Med. Vol 61 January 1980.

Sivak, Michael, Ph.D., Olsen, D.J., Driving and Perceptual Cognitive Skills: Behavioral Consequences of Brain Damage, Archives of Phys. Med. Vol 62 October 1981.

Szeto, A.Y. J. and Hogan, H.A. An Evaluation Simulator for the Scott Van. Proceedings of the First Southern Biomedical Engineering Conference, June 1982. LSU Medical Center, Shreveport, LA.

Zider, Steven J., Gold, Marc W., Behind the Wheel Training for Individuals Labeled Moderately Retarded, 'Exceptional Children' May 1981.

NEWSLETTERS

ADED Newsletter
Carmello Strano, Editor
Moss Rehabilitation Hospital
Transportation Center
12th Street and Tabor Road
Philadelphia, PA 19141
Official publication of the Association of Educators for the Disabled. Published quarterly and distributed to ADED members.

Driver Education Digest
Virginia Anderson, Staff Editor
P.O. Box 5038
Southfield, MI 48037
Publication of the Chevrolet Motor Division

AUDIOVISUALS

"On Par". 28 minute color film/video describing the Driver Education Program. Available from Coordinator, Driver Education Programme, Rehabilitation Medicine, Glenrose Hospital, 10230 111th Avenue, Edmonton, Alberta T5G OB7, Canada.

"Driver Education for the Handicapped" Available from Memphis City Schools, 2687 Avery, Memphis, Tennessee 38112.

Special Equipment for Handicapped Drivers", 21 minutes. **"Vehicle Selection for the Disabled Driver"**. Available from Supervisor of Physical Education, Health and Safety, Des Moines Public Schools, 1800 Grand Ave., Des Moines, IA 50307

"Right of Way". 25 minutes. Available from Margaret Young, O.C.C.C., Toronto, Canada, also Canadian Filmmakers Distribution Centre, 144 Front Street, W., Toronto, Ontario M5J 2L7, (416) 593-1808 (rental or purchase), and COE Film Associates, 65 E. 96th Street, New York, NY 10028, (212) 831-5355.

"Physically Disabled Drivers"; Part I "Assistive Devices (28.30 minutes, 3/4" video), **Part II "Applicants"** (30.15 minutes). Available from Mr. Michael Bloom, A/V Department, New York University Medical Center, 550 1st Avenue, New York, NY 10016, (212) 340-5449, and Mr. Bernie Macklin, Sales Department, Movielab Incorp., 619 W. 54th Street, New York, NY 10019. Training films produced for New York State Motor Vehicle License Inspectors, by N.Y.U. Medical Center.

RESEARCH

NIHR-funded research in this area is being done by:

Louisiana Tech University
P.O. Box 10348
Ruston, LA 71272
318/257-4562
Duane F. Bruley, Ph.D., director
Core area: Transportation of the handicapped -- personal licensed vehicles

The Emergency Reaction Driver Training Program (ERD), taught at Liberty Mutual Research Center in Hopkinton, Massachusetts, has trained licensed drivers in improvement of skills necessary to handle typical highway emergency situations for a number of years. The center conducted a pilot program to investigate the feasibility of improving, through instruction and practice, the capability of physically handicapped licensed drivers to handle emergency driving situations. The center offered 2-day classes in 1982. Eleven physically disabled drivers took part in the pilot program and each driver felt he benefited from the training and recommended that ERD training be included as part of rehabilitation training.

For organizations that provide driver evaluation and training, see The Handicapped Driver's Mobility Guide or contact ADED.

Control, Communication and Sensory Aids

CONTROL, COMMUNICATION AND SENSORY AIDS 193

CONTROL 193

INTRODUCTION 193
CONTROLLER CHARACTERISTICS 194
GUIDELINES FOR SWITCHES 195
GUIDELINES FOR GOOD INTERFACES 195
INTERNATIONAL STANDARDIZED INTERCONNECTION PROJECT 196
SELECTED PUBLICATIONS: CONTROL AND ASSESSMENT 197
SOME MANUFACTURERS & DISTRIBUTORS OF CONTROLS 198
ALTERNATIVES TO PURCHASE: DO IT YOURSELF 201
R&D ORGANIZATIONS 202

COMMUNICATION 203

WHAT KINDS OF COMMUNICATION TECHNIQUES ARE AVAILABLE? 203
WRITING & TYPING 204
ISAAC 205
GUIDES TO COMMUNICATION AIDS 205
SELECTED PUBLICATIONS 206
AUDIOVISUALS 207
SERVICE CENTERS 208
NONSPEECH ADVOCACY ORGANIZATIONS 211
SOME COMMUNICATION AID MANUFACTURERS 213
RESEARCH & DEVELOPMENT 215

SENSORY AIDS 216

TECHNOLOGY FOR PEOPLE WITH IMPAIRED VISION 216
SELECTED PUBLICATIONS 216
PRODUCT CATALOGS 217
AUDIOVISUALS 217
OTHER RESOURCES 218

TECHNOLOGY FOR PEOPLE WITH IMPAIRED HEARING 219
EQUPMENT DEMONSTRATION CENTERS 219
DEAFNET 219
SELECTED PUBLICATIONS 220
ORGANIZATIONS 222
TDDs 223

CONTROL

INTRODUCTION

"Access to the present day world of technological aids to mobility, communication, environmental control and computer use for people with physical limitations is frequently dependent upon a rather commonplace device, the switch. One or more switches are used to create controls. A control is defined as 'a mechanism used to regulate or guide the operations of a machine, apparatus, or system,' and, more philosophically, as 'power or authority to guide or manage' (Webster's New Collegiate Dictionary, 1973) The most wondrous device or the simplest toy will be useless or underused if the user cannot make it work."

from the introduction to A Guide to Controls: Selection, Mounting, Applications.

A Guide to Controls: Selection, Mounting, Application has been compiled to help users select and locate the most useful switches and controls for operating assistive devices. Included in the guide are illustrations and descriptions of the most frequently used commercially available controls; information on matching controls to devices and users; examples of methods used to effectively mount and stabilize controls; and applications of systems with controls in use.

The resource section refers users to manufacturers, research organizations, service/assessment centers and selection publications concerning controls, and directs users to information on controls not included in the guide. References are included on communication aids, using devices in the classroom, microcomputer applications, funding sources and do-it-yourself projects.

Rehabilitation Engineering Center, Children's Hospital at Stanford, December 1982. Available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814, 301/657-4142. $15.00.

Selecting a Control

People use controls such as steering wheels, knobs, levers, pushbuttons and toggle switches to interact with systems. Controls usually enable a user to make a change in the system, and are often used with displays. A system is a machine designed to carry out a purpose, such as communicating with a telephone and/or speech synthesizer, getting around in an automobile and/or wheelchair, or controlling the environment by turning on lights and opening doors.

The controls which a person is able to use must be determined before making decisions regarding the selection of assistive devices. A systematic approach can be used to select an appropriate control that can be used by an individual to interact with a device. There are three major steps in selection a control: (1) control site selection, (2) control selection and (3) comparative testing of the control site/ control combination.

The chart on the next page summarizes control approaches.

Service Centers

For a list of agencies that can provide assessment and other services in the area of communication and control, see the list in the **Communication** section.

CONTROLLER CHARACTERISTICS

The following table summarizes what might be expected for various controller approaches. All but the last two entries are for proportional controllers. Any controller type can be implemented as a four switch solution, but one should expect a reduction in rate of maneuverability.

Type	Control Scheme	Potential Effectiveness of Control	Special Requirements	Major Advantages	Major Disadvantages
CHIN (normal joystick)	push in corresponding directions	good, proportional	large range of motion of head needed	can be attached to wheelchair main frame	large and bulky, range of motion, appearance, interferes with face oriented tasks
CHIN (short throw)	push in corresponding directions	good, proportional	worn as collar which should be fitted	requires very small range of motion, not tiring	cosmetics, might interfere with face oriented tasks
HEAD REST CONTROL	see opposite page	good, proportional	control for reverse is not continuous (extra switch)	good appearance slight interference with face oriented moves	during control phases the head rest is not a resting place
JOYSTICK	push in corresponding directions	good, proportional	"functional" hand or arm	good appearance	requires some remaining arm/hand function
ARM/ ELBOW	arm for./back. = velocity; elbow in/out = turn	fair to good, proportional	reasonably strong movements needed	good appearance	arm movements must be able to resist jerk and other inertial inputs
HEAD CONTROL	push in corresponding direction	fair to good, proportional	must maintain head position		inertially induced movements of head can interfere
SHOULDER POSITION	elev./depress = velocity; protract/retract. = turn	good, proportional	adhesive or harness for attachment to chest and shoulder	worn under clothing, little interference, extremely cosmetic	may involve extensive training requirements, allergic reaction to adhesives, mounting requirements.
FOOT/ LEG/ KNEE/	many possible configurations	fair to good proportional	accommodation of entrance and exit from wheelchair	in CP, may be whats available	potential interferance whenever leg hits anything
PNEUMATIC (puff/sip)	hard puff/sip = for./back time = speed soft puff/sip = turn rates	slow to med. maneuvering, good straight-aways	good breathing capabilities	good appearance – may be among the few possible solutions	does not provide continuous porportional control, saliva
SWITCH SOLUTIONS	#1 sw. = forw. #2 sw. = right #3 sw. = back #4 sw. = left	slow and hard to maneuver, awkward on straight aways	can be least demanding solution for the operator	most tolerant to severe spasticity	difficult to maneuver

Romich Beery Bayer

GUIDELINES FOR SWITCHES

"Switch Rules and Considerations for Communicator Use" in Communication Outlook, Volume 5, No. 3, Winter 1984, page 7, was written by William F. Tracy and Debra Bevans, of the Department of Psychology, Clover Bottom Developmental Center, 275 Stewarts Ferry Pike, Nashville, Tennessee 37214. This article is applicable for people putting switches on devices for severely motor impaired persons. Besides listing the 10 factors (see below) which should be considered, they also explain some safety procedures to be followed.

1) Any switch must be safe for the user.

2) The switch must be operated with a minimum of user effort and maximum user comfort.

3) The switch must be reliable.

4) Switches must be minimally noticeable and, if possible, cosmetically pleasing.

5) If possible, the switch should move with the user, who must be able to activate the switch without the need to "find" it.

6) Switches must permit disassembly for cleaning and maintenance.

7) Switches should use standard components which are readily available and replaceable whenever possible.

8) The switch should be the simplest to serve its purpose -- do not overdesign.

9) The switch must be sturdy.

10) All switches should be duplicable and duplicated.

SOME GUIDELINES FOR GOOD INTERFACES

These guidelines for mass market products appeared in the April 1980 issue of High Technology magazine. They can and perhaps should be used by people working with technology for special needs, too. (Editor)

1. The device should provide what the user wants, needs, and expects. If it requires the user to adapt (and every product will do this to some extent), the initial changes should be as small as possible and in a direction that the user will perceive in advance as positive.

2. The user -- not the product -- should be in command. Users should never feel that the product is arbitrarily dictating how they must interact with it, but should feel that the product is adapting to their individual requirements.

3. The user should feel confident in the product -- its usefulness and reliability -- right from the start. The new user should view the product as friendly and helpful, and a sophisticated user should be able to operate it without unnecessary constraint. As the user progresses, he should be able to speed up his interaction, increasingly viewing the device as an extension of himself.

4. The product should provide unambiguous feedback to the user. Alternatives should be clearly spelled out and easy to execute.

5. Ideally, the product should require no instruction manual. The user should feel that he and the product are a self-sufficient whole. If some guidance must be provided, the simpler the better.

INTERNATIONAL STANDARDIZED INTERCONNECTION PROJECT

There has been a very rapid increase in electronic communication and control aids for individuals having severe and multiple physical disabilities within the last few years. A large variety of different aids, interfaces, and accessories has been developed to meet the very diverse needs and capabilities of the different disabled individuals. As might be expected, nearly every researcher and manufacturer chose a slightly different connector, pin-out, voltage convention or format for their aids, interfaces, and accessories. The restrictions brought on by incompatibility of different systems has created severe (and unnecessary) problems. The end result can be that the handicapped individual is fitted with an aid, interface, and accessories which do not adequately meet his/her needs.

A group of manufacturers, clinicians and researchers are working on the development of a set of proposed compatibility standards for electrical communication aid devices for conversation, writing, and computer access. Developing a common format will allow easier identification of interfaces, aids, and accessories which can work together; and will ensure that such aids can, in fact, be connected. This objectives of the project are:

1) to develop common technical formats/ for aids and interfaces. This includes factors related to voltage, writing, etc.
2) the designation of an agreed-upon common connector/s.
3) to develop of a simple, straightforward naming or labeling format which will enable non-technical people to mix and match aids, interfaces, and accessories which are electronically and mechanically compatible to meet the needs of the handicapped individual.

In trying to develop a single standard, the group found that one standard would be insufficient. It was determined that compatibility for communication aid interconnections would be facilitated by the development of separate compatibility standards for functionally distinct situations. This makes each separate standard simpler and easier to implement, and will make it easier to get the necessary concensus. They are currently working on the following compatibility standards proposals.

Simple Electrical Transducer Compatibility Standard (SET)

The SET Compatibility Standard is meant to cover the connection between simple electrical transducers (switches, potentiometers, and rheostats) and communication aids. More sophisticated transducers such as EMG transducers can be used with the SET Compatibility Standard if they emulate one of the simple transducers.

SET Serial Conversion Compatibility Standard (SETSC)

The SETSC Compatibility Standard proposal allows information from switches and pots to be transmitted on a single RS-232C serial channel simultaneously. This standard is also used for sending position information from long range light pens, and other devices that send X x Y coordinates.

Input Selection Array Compatibility Standard (ISA)

The ISA Compatibility Standard is meant to cover separate Input Selection Array devices that can be plugged into a communication aid or computer. These include touch panels, special keyboards (keyboards that are meant for one-at-a-time selection by location), scanning panels that can output a discrete selection after interacting with the user through a simple switch, and other devices that allow the user to make a single selection at a time from a displayed array of selections.

Keyboard Emulator Input Compatibility Standard (KEI)

The KEI Compatibility Standard proposal is meant to cover the connection between a communication aid and the keyboard emulator for a computer running standard software. Keyboard emulators are devices designed to accept electronic data input and to introduce that data into a computer running standard software in such a way that it is indistinguishable from data input on the keyboard. The form of the data input to the keyboard emulator is the focus of the KEI Compatibility Standard proposal (the output of the keyboard emulator will always be specific to a particular computer and therefore not standardizable).

Keyboard Emulator Input Morse Code Compatibility Standard (KEIMC)

The KEIMC Compatibility Standard is a superset of international Morse code. Using a three-state sequential code, it will produce the complete ASCII character set, common non-ASCII keys such as arrow keys, and the special KEI functions such as "HOLD" for emulating key combinations.

Subsystem Bidirectional Communication Compatibility Standard (SBC)

The SBC Compatibility Standard is meant to cover bidirectional communications between communication aid subsystems such as a portable main processor, input display, output display, printer, voice output subsystem, environmental controller, modem, and wheelchair controller.

The International Standard Interconnection Project began with finding by the National Science Foundation, and is currently being supported by the National Institute of Handicapped Research.

For more information about the current status of the project, please contact The International Communication Aids Compatibility (ICAC) Standards, c/o Trace Research and Development Center, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53706, 608/262-6966.

213

SELECTED PUBLICATIONS RELATED TO CONTROLS AND ASSESSMENT

"An Assistive Equipment Controller for Quadriplegics," by G. Schmisser and W.Seamone, The Johns Hopkins Medical Journal 145:3, 84-88, Sept. 1979.

A Comparative Study of Control and Display Design Principles Which Affect Efficient Use of Communication Aids by the Severely Disabled, Final Report, Rehabilitation Engineering Center, Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304.

"Computers Can Play A Dual Role for the Disabled," by Gregg Vanderheiden, Byte, Vol. 7, No. 9, Sept 1982.

"Controls," by Larry Weiss, Proceedings of the 1981 Conference on Access to Technology. Rehabilitation Engineering Center, Children's Hospital at Stanford, Palo Alto, CA, 1981.

Enhancing the Educational Potential of Non-Oral Children Through Matching Communication Device Capabilities to Children's Needs, Final Report submitted to Department of Education for Field Initiated Research Project. Colette L. Coleman, PhD, Albert M. Cook, PhD, and Lawrence Meyers, PhD, Grant #G007902261, CFDA #13.443c, 1982.

"Factors Affecting Communication Rate in Non-Vocal Communication Systems," by Michael J. Rosen and Cheryl Goodenough-Trepagnier, Proceedings of the Fourth Annual Rehabilitation Engineering Conference, Washington, DC. Available from Rehabilitation Engineering Society of North America, 4405 East West Highway, Bethesda, MD 20814.

Guide to Controls: Selection, Mounting, Applications. Rehabilitation Engineering Center, Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304, $10.00 prepaid.

"Human-Controlled Electric Wheelchair," by J. H Aylor, B.W. Johnson, R.L. Ramsey, and C.T. Swanson, Medical and Biological Engineering and Computer Journal, 17:6, 776-778, Nov. 1979.

Human Performance Engineering: A Guide for Systems Designers, by Robert W. Bailey. Prentice-Hall, Inc., Englewood Cliffs, NJ, 1982.

"Interface Control Training for Persons with Cerebral Palsy: A Pilot Study," by G.F. Shein and M. Chown, Proceedings of the Fifth Annual Rehabilitation Engineering Conference, Houston, Texas, 1982. RESNA, 4405 East West Highway, Bethesda, MD 20814.

"Interfacing Computers for the Disabled," by Alan Kirschenbaum, Zohar Eilam, and Arie Melnik, Proceedings of the Fifth Annual Rehabilitation Engineering Conference, Houston, Texas, 1982.

Manual on Management of the Quadriplegic Upper Extremity, by M.H. Malick and C.M. Meyer, 1978. 201 pages. Available from Fred Sammons, Inc., Brookfield, Illinois. Includes a section on environmental control systems, wheelchair control systems and criteria for selection of orthoses, controls and power sources.

"Microprocessor-Based Assessment of Controller Interfaces for Disabled Users," by C. Basacchi, S. Naumann, PhD, and M. Milner, PhD, Proceedings of the Fourth Annual Rehabilitation Engineering Conferences, Washington, DC, 1981.

"Model for a Computer-Based Procedure to Prescribe an Optimal 'Keyboard,'" by Cheryl Goodenough-Trepagnier, and Cheryl and Michael J. Rosen, Proceedings of the Fourth Annual Rehabilitation Engineering Conference, Washington, DC, 1981.

Proceedings of the Second International Conference Non-Speech Communication, November 15-17, Ontario Institute for Studies in Education, Toronto, Ontario, Canada, 1982.

Proceedings of the Seminar on Electronic Controls for the Severely Disabled, Vancouver, British Columbia, Canada, 1974. Available from Kinsmen Rehabilitation Foundation, 2256 W. 12th Ave., Vancouver, British Columbia, V6K 2N5, Canada.

"Specification of Interfaces for Communication Aids," by Nigel Ring, Proceeding of Workshop on Communication Aids. Canadian Medical and Biological Engineering Society, c/o National Research Council, Ottawa, Ontario 10, Canada, K1A OR8, June, 1977.

"A Single Switch Control for Wheelchairs and Other Equipment," by Nelson D. Durie, Med. Progr. Technol., 6:15-18, 1978.

"Sensors, Controls and Man-Machine Interface for Advanced Teleoperation," by Antal K. Bejcey, Science, 208:4450, 1327-135, June 20, 1980.

"A Study of Neuromotor Control in Athetoid Children," by E. Paul Goldenberg, Proceedings of the Fourth Annual Rehabilitation Engineering Conference, Washington, DC, 1981.

"A Systematic Approach to Choosing Interfaces for Assistive Devices," by A.M. Cook and M.R. Barker, Final Report submitted to Department of Education for Field Initiated Research Project, Grant #G007902261.

"A Systematic Approach to Evaluating Physical Ability for Control of Assistive Devices," by Margaret R. Barker and Albert M. Cook, PhD, Proceedings of the Fourth Annual Rehabilitation Engineering Conference, Washington, DC, 1981.

"Towards Standardization of Communication and Control Systems for Motor Impaired People," by I. Morasso, P.M. Penso, G.P. Suetta, and V. Tagliasco, Medical & Biological Engineering & Computing, 17:481-488, 1979.

SOME MANUFACTURERS AND DISTRIBUTORS OF CONTROLS

Abbey Medical
Catalog Sales
13782 Crenshaw Blvd.
Gardena, CA 90249
(800) 421-5126 - national
(800) 262-1294 - California
Distributes some controls for communication aids, environmental control and mobility systems. Durable medical goods, therapy equipment.

Allied Business Machines
9281 Earl Street
La Mesa, CA 92041
(714) 461-6361
Distributes control switches and telephone devices.

Arizona State Division of Developmental Disabilities
Adaptive Aids Program
P. O. Box 13178
Tucson, AZ 85732
(602) 745-5588
Has available therapist-developed, client-manufactured switches and systems for cognition and motor training, communication and environmental control.

Basic Telecommunications Corporation
4414 E. Harmony Road
Ft. Collins, CO 80525
(303) 226-4688
Designs, manufactures and/or distributes technical aids, with emphasis on environmental control, telephone and telecommunications, bed control, and switch interface equipment. Will do private label manufacturing.

BSR
Route 303
Blauvelt, NY 10913
(914) 358-6060
Manufacture control switches for use with their environmental control systems.

Linda L. Burkhart
8315 Potomac Avenue
College Park, MD 20740
Designs and manufactures switches and adaptations for control of toys; provides how-to books for toy adaptation.

Computers for the Physically Handicapped
7602 Talbert Ave., Unit 4
Huntington Beach, CA 92647
(714) 848-1122
Design, manufacture, and distribute controls for access to computers, environmental control, and communication systems.

Contemporary Artistic Tech
Station L
P. O. Box 58430
Vancouver, B.C. V6P 6K2 Canada
(604) 324-8119
Distribute controls, switches, expanded keyboard systems, communication systems, electronic reading and speech synthesizer systems.

Dickey Engineering
3 Angel Road
North Reading, MA 01864
(617) 664-2010
Design, manufacture and distribute control switches for use with call systems, environmental control, and page turning systems.

Dufco
901 Iva Court
Cambria, CA 93428
(805) 927-4392
Design and manufacture communication aids, wheelchair control systems, Borg Warner System80 teaching system interfaces.

Du-It Control Systems Group, Inc.
8765 Township Road 513
Shreve, OH 44676-9421
(216) 567-2906
Designs and distributes wheelchair control systems for the severely disabled, including same-switch access to environmental control, typing and computer.

EKEG Electronics Co., Ltd.
P. O. Box 46199
Station 'G'
Vancouver, B. C., Canada
Distribute expanded keyboard control switches' lever.

FashionABLE
15 Crescent Avenue
Rocky Hill, NJ 08553
(609) 921-2563
Distribute devices and gadgets, some of which are controls, addressed to the rehabilitation area.

General Teleoperators, Inc.
15118 Downey Ave.
Paramount, CA 90723
(213) 634-6531
Distribute switches (body contact, tongue, lever, remote control, pneumatic) for use with their environmental control systems.

Hammacher Schlemmer
147 East 57th Street
New York, NY 10012
Distribute remote control on/off for appliance control, other devices and gadgets targeted to the general consumer.

Hammatt and Sons
1721 South 2nd Street
Mt. Vernon, WA 98273-5299
Distribute gadgets and devices of general and consumer interest, some of which are of interest to the rehabilitation market (i.e., small headset microphone).

Neil Henson Company
P. O. Box 132
Jackson, MO 63755
Distribute general consumer devices and gadgets, some of which are of interest to the rehabilitation area; e.g., appliance on/off controls).

KY Enterprises
3039 East Second Street
Long Beach, CA 90803
(213) 433-5244
Design and manufacture controls for Atari electronic games systems.

Linemaster Switch Corporation
Woodstock, CT 06281
(203) 974-1000
Distribute general market control switches, many of which are of interest to the rehabilitation area.

MED, Inc.
1701 South First Avenue
Maywood, IL 60513
(312) 681-2828
Design and/or distribute, through affiliated vendors, durable medical goods, therapy equipment, self-help devices, and technical aids, including wheelchair and environmental control systems.

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8 Canada
(418) 425-6220
Design, manufacture and distribute various aids to the disabled, including switches for wheelchair control and Blissymbol communication boards.

Phonic Ear/Phonic Mirror, Inc.
250 Camino Alto
Mill Valley, CA 94941
(415) 383-4000
Design and manufacture augmentative and training aids for the hearing impaired and communication impaired. Distribute switches.

Possum, Inc. (USA)
c/o International Hospital Products
82 Birch Avenue
Little Silver, NJ 07739
(201) 842-1246
Develop and distribute technical aids to the disabled, including typing systems (with or without word processing capability), environmental control systems, and teaching machines.

Prentke Romich Company
8769 Township Road 513
Shreve, OH 44676-9421
(216) 567-2907
Design, manufacture and/or distribute switches and technical aids for communication, environmental control, computer access.

Pres:Air:Trol Corp
895 Mamaroneck Avenue
Mamaroneck, NY 10543
(914) 698-9332
Distribute switches: pneumatic, pendant, soft button, push button, handle grip, foot pedal, remote control.

Quadra Productions, Inc.
13 East 9th Street
New York, NY 10003
(212) 673-7810
Design, manufacture and distribute control switches for use with their emergency call systems.

R/M Systems, Inc.
22903 Fern Avenue
Torrance, CA 90505
(213) 534-1880
Design, manufacture and distribute control switches and computer access systems.

SciTronics, Inc.
523 S. Clewell Street
Bethlehem, PA 18015
(215) 868-7220
Distribute encoding control switches for their communication and environmental control systems.

Simon Associates
1019 Trillium Lane
Mill Valley, CA 94941
(415) 381-0835
Distribute Audiolite, a sound-activated light switch.

Tapeswitch of America
100 Schmitt Blvd.
Farmingdale, NY 11735
(516) 694-6312
Distribute tape and leaf switches for touch or foot control.

TASH, Inc.
c/o Sunnybrook Medical Centre
2075 Bayview Avenue
Toronto, Ontario, M4N 3M5, Canada
(416) 486-3568
Develop and distribute switches and systems (either simple or sophisticated) for communication, typing, and computer access.

Technical Aids to Independence, Inc.
12 Hyde Road
Bloomfield, NJ 07003
(201) 338-8826
Distribute remote control, pneumatic, touch and cushion systems for use with their telephone and environmental control systems.

Tellagraphics
401-DN Interurban St.
Richardson, TX 75080
(214) 238-9297
Distribute foot, lever and position control switches, for use with their communication systems and adapted toys.

Trujillo Industries
5040 Firestone Boulevard
South Gate, CA 90280
(213) 564-7943

Distribute body contact switches. Also, devices and systems related to mobility aids and vehicles.

Universal Controls Corp
10889 Wilshire Blvd.
Los Angeles, CA 90024
(213) 208-4509

Distribute control switches, remote controls for appliances.

Zygo Industries, Inc.
P. O. Box 1008
Portland, OR 97207-1008
(503) 297-1724

Design and/or distribute switches and systems for wheelchair control, communication, computer access, and toys. Also modify, for the use of the disabled, devices designed for the general consumer market.

ALTERNATIVES TO PURCHASING SPECIAL CONTROLS: DO-IT-YOURSELF

There are alternatives to purchasing special controls. Be creative in shopping! Look for regular mass market products, especially electronic games and convenience appliances.

You can also make adapted controls. These publications have instructions for do-it-yourself projects. Most of them assume that you will not have much previous experience with control fabrication.

Guidelines for Adapting Battery Operated Toys, revised 1982, by Jayne Higgins. California Avenue School, Jayne Higgins, Speech Pathologist, 214 W. California Avenue, Vista, CA 92083. $3.00. This 25-page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch. Toy to in-line jack procedures are also given which permits easy and immediate interchange of information on common pitfalls and problems. Information on where to obtain materials and toys through nation wide stores is included (i.e. Sears catalog, Radio Shack catalog). All switches are relatively inexpensive to make ($2.00-$5.00).

Helping the Handicapped: A Guide to Aids Developed by the Telephone Pioneers of America. Call the Telephone Company Headquarters in your city and ask for the local chapter of the Telephone Pioneers of America. Though many of the devices are for the communication impaired, there are sections on mobility aids, ADL equipment, and toys.

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, second edition, by Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740, 1982. 50 pages. $5.00 plus $1.00 postage and handling. This book gives simple directions for constructing toys and switches that can be easily operated by severely and profoundly handicapped children. No special skills are needed to make them. All supplies can be found around the the house or purchased inexpensively at local stores. One example is a head control switch. The materials cost about $2.50 and takes about half an hour to construct. The switch is attached to the child's head with a barrette and plugged into a toy or tape recorder. When the child lifts his or her head, the music or toy turns on, thus giving the child a reason to lift their head.

"Instructions for Constructing a Large Area Flap Switch (LAFS) to Allow Disabled Children to Control Battery Operated Toys," by G. Fraser Shein. Biofeedback Research Project, Rehabilitation Engineering Department, Ontario Crippled Children's Centre, 350 Ramsey Road, Toronto, Ontario M4G 1R8, Canada. November, 1980.

More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities, by Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740, 1982. $12.50. Continuation of the first book. Includes a section on suggested activities for incorporating these devices into the child's program.

Making Aids for Disabled Living, by Stuart Grainger. Accent Special Publications, Box 700, Bloomington, IL, 1981. 88 pages.

Rehabilitation Engineering Sourcebook. Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046, 1979.

Telephone Accessories You Can Build, by Jules H. Gilder. Hayden Book Company, Inc., Rochelle Park, NY, 1976. 84 pages. $6.50.

"Therapeutic Devices 1956-1976," by J. Bellman, et al, American Journal of Occupational therapy. American Occupational Therapy Association, Inc., 6000 Executive Blvd., Rockville, MD 20852, 1977. 112 pages. Do-it-yourself instructions for devices which have appeared in AJOT, includes wheelchair trays, ADL devices, communication aids, etc.

Toy Adaptation, by Chris Wethered. Canadian Association of Toy Libraries, 60n Quebec Avenue, Suite 1207, Toronto, Ontario M6P 4B4, Canada, June 1979. 14 pages. Basic information needed to adapt battery-operated toys for activation by disabled children.

Toy Modification Note: Build it Yourself Battery Interrupter, by Gregg Vanderheiden. Trace Center, University of Wisconsin, Madison, WI. 13 pages.

Wobble Switch Toy Control Switch: A Do-It-Yourself Guide, by Ben Brown. TRACE Center, University of Wisconsin, Madison, WI, 1980. 3 pages.

Local Radio Shack Stores are convenient places to buy electrical supplies. Electronics stores also sell these parts; they are listed in the yellow pages under "Electronic Equipment and Supplies."

RESEARCH AND DEVELOPMENT ORGANIZATIONS

The following organizations are currently doing research in the area of control:

Artificial Language Laboratory
Department of Computer Science
Michigan State University
East Lansing, MI 48824
(517) 353-6622
Contact: John Eulenberg

Assistive Device Center
California State University, Sacramento
6000 "J" Street
Sacramento, CA 95814
(916) 454-6422

Cerebral Palsy Research Foundation of Kansas, Inc.
Rehabilitation Engineering Center
P.O. Box 8217
2021 N. Old Manor
Wichita, KS 67208
(316) 688-1881

Children's Hospital at Stanford
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, CA 94304
(415) 327-4800, ext 345

Children's Hospital Medical Center
Rehabilitation Engineering Center
300 Longwood Avenue
Boston, MA 02115
(617) 735-6594

Institute of Rehabilitation Medicine
Rehabilitation Engineering Center
New York University Medical Center
400 East 34th Street
New York, NY 10016
(212) 340-6042
Contact: Myron Youdin

Massachusetts Institute of Technology
Rehabilitation Engineering Center
Building 31, Room 63
Cambridge, MA 02139
(617) 253-5333
Contact: Michael Rosen

Moss Rehabilitation Hospital
Rehabilitation Engineering Center
12th Street and Tabor Road
Philadelphia, PA 19141
(215) 329-5715
Contact: Serge Minassian

Northwestern University
Rehabilitation Engineering Center
345 East Superior St., Room 1441
Chicago, IL 60611
(312) 649-8560
Contact: Dudley Childress

Ontario Crippled Children Centre
Rehabilitation Engineering Dept.
350 Rumsey Road
Toronto, Ontario MTG 1R8
Canada
(416) 425-6220

Palo Alto Veterans Administration Medical Center
Rehabilitation Engineering R&D Service
3801 Miranda, Bldg. 51
Palo Alto, CA 94304
(415) 493-5000
Contact: David Jaffe

The Trace Center
University of Wisconsin
1500 Highland Avenue
314 Waisman Center
Madison, WI 53706
(608) 262-6996

Tufts New England Medical Center
Rehabilitation Engineering Center
171 Harrison Avenue
P.O. Box 1014
Boston, MA 02111
(617) 956-5625

University of Tennessee
Rehabilitation Engineering Center
682 Court Avenue
Memphis, TN 38163
(901) 528-6445

University of Virginia
Rehabilitation Engineering Center
P.O. Box 3363, University Station
Charlottesville, VA 22903
(804) 977-6730

The following commercial manufacturers are also doing focused research in the area of control. They can also develop or adapt special one-of-a-kind controls:

Du-It Control Systems Group, Inc.
8769 Township Road 513
Shreve, OH 44676
(216) 597-2906

Prentke Romich Company
8769 Twp. Road 13
Shreve, OH 44676
(216) 567-2906

Zygo Industries, Inc.
P.O. Box 1008
Portland, OR 97207
(503) 297-1724

COMMUNICATION

This response to a commonly asked question was written by the Trace Center; although focused on a child, it is also relevant for adults who need communication assistance. It is particularly interesting for its inclusion of WRITING as a communication technique, an area is far too frequently overlooked. (editor)

Q: I HAVE A SEVERELY PHYSICALLY HANDICAPPED SON/DAUGHTER. WHAT KIND OF COMMUNICATION TECHNIQUES ARE AVAILABLE?

"In answering this question, you should be aware that there are two basic areas with which your child may need help: 1) Conversation/interaction, and 2) Writing.

Communication

"The communication need that we think of first is conversation/interaction. A basic problem is that many individuals are not able to use speech for communication and interaction. As a result, we need to look toward some augmentative or supplemental technique to help him/her with communication. In some cases, they may not be able to speak, but may be able to communicate regarding some topics in some environments with some people at some times. However, unless the person is able to communicate and be understood at all times, some type of supplemental technique is indicated.

"In general, an augmentative aid is necessary unless the individual can communicate about all topics with all people. The augmentative aid would not replace his/her residual speech, but would simply back it up. When the individual could speak, he/she would use that mode (or any other mode that was most efficient). When he/she was unable to communicate through his/her other means, he/she would turn to the back-up or augmentative system to communicate.

"There is a wide variety of specific techniques which can be used for communication. All of these techniques can be implemented in one form or another without the use of electronic aids. Pointing to words or symbols on a communication board is one example. There are also techniques which can be used by an individual who is so severely involved that he/she is barely able to move an eye in one direction, and has no other volitional body movements at all. These techniques, all of which can be implemented without any technology, can provide even the most severely physically involved individual with a mechanism for communicating. For individuals who can spell, the techniques can allow the individual to spell out exact messages, to write letters, etc. These unaided techniques, however, require the presence of a second person to interpret signals.

"Communication aids are also available. These aids are essentially automated versions of the fundamental (non-technical) techniques described above. The primary advantage of aids is that they allow the individual to be able to assemble messages independently. While not as essential for conversation and interaction (since a second person is there by definition in conversation), these aids can be very important for providing the individual with a means of doing independent work and writing.

Writing

"The second area of need is writing. Essential to any educational process is the ability to write and do independent work, take notes, do homework, and complete assignments. We would not think of sending a normal individual to school without pencil and paper; nor would we allow him/her to go to school without doing the homework and assignments. It would be very difficult if not impossible for him/her to receive a full and adequate education. For those individuals who have the ability to recognize words and learn to spell, some type of writing system will be needed.

"When choosing a communication aid, it should be remembered that the need for aids stems from their ability to be used independently. The primary need for this independence is in messaging and writing. For conversation, the fundamental and unaided techniques are usually faster and more flexible. When looking at independent aids, the writing needs must be considered very carefully, and should weigh heavily in the selection process.

Rate

"A key factor that you will want to look for with conversation or writing systems is the rate of communication. The various techniques (whether aided or unaided) each require different abilities from the handicapped user, and have different efficiencies or speed factors. Some techniques can be used by only a small portion of the handicapped population, but are faster. Other techniques can be used by anyone, but are generally slow (for example, scanning techniques). Thus the problem is not finding a technique which an individual can use, but rather finding the technique which will allow a given individual to communicate most rapidly. It is not uncommon for different techniques to vary in their communication rates by a factor as great as ten to one. Thus, what would take a minute to communicate using one aid might take ten minutes on another; and what would take five minutes on one aid might take almost an hour on another. Since there are many specific techniques and aids as well as variations on their application, it is not a simple task to find the best aid for a given individual. For this reason, it is usually best to involve someone with special training and an in-depth knowledge of all of the various techniques and approaches, especially the newer ones, when making a selection for a more expensive aid.

"This problem is compounded by the fact that there are many therapy and training techniques which can greatly enhance the physical abilities which a given child (or adult) is able to exhibit. Someone familiar with and trained in these specific strategies may well be able to interface a child

to a much faster aid than a person less familiar with these strategies. Because the field is so new, there is a severe shortage of these specially trained individuals at the present time. Efforts are being made to document these specific strategies and to make them available to individuals through special training materials and programs.

Information Sources

"In the meantime, you may want to invest some time learning about the various techniques and approaches yourself. This will assist you in your interactions with professional teams. The first recommendation is that you subscribe to Communication Outlook. This very application-oriented newsletter gives you a window on all of the latest developments in this field. This includes information on new aids as well as new books and publications which come out in this area. In addition to subscribing to the newsletter, you may want to also get copies of the back issues, since there are many things which have already occurred about which you may want to be aware, but which would otherwise be very difficult to find.

"For general introduction information on the various techniques, you might look at Non-Vocal Communication Techniques and Aids for the Severely Physically Handicapped, by Vanderheiden and Grilley, and/or several chapters in NonSpeech Language Intervention Strategies by Richard Schiefelbusch. Both of these books contain overviews of the basic approaches as well as specific information on symbol systems and the design of fundamental communication boards. For a listing of all of the existing commercially available aids, the most comprehensive source available is the Non-Vocal Communication Resource Book. This is a three-ring binder which contains a two-page description, including photograph, of each of the aids which is available in this area. There is also an Update Subscription Service for the book, which prepares and sends out new entries so that you can be apprised of all of the latest developments. (Also see: The Comparative Chart of Commercially Available Communication Aids, available from Prentke Romich Company, 8769 Township Road 513, Shreve OH 44676.)"

PUBLICATIONS RELATED TO COMMUNICATION AVAILABLE FROM THE TRACE CENTER

1983 Revised Non-Vocal Communication Resource Book. G. C. Vanderheiden, L. Krause, 1983. This resource book provides a two-page description (including picture) of over 90 commercially available aids for non-vocal communication. Revised in 1983 to include all of the entries which have been added in the three sets of updates since original publication. 3-hole punched and bound in a 3-ring plastic binder. NOTE: If you have the original book AND ALL THE UPDATES, you will not want to order this book, since it does not contain additional information. Updates are made available periodically to keep the Resource Book current.

AUGMENTATIVE MODES OF COMMUNICATION FOR THE SEVERELY SPEECH AND MOTOR IMPAIRED G.C. Vanderheiden, 1979. (Prepared for Congenital Malformation - Its Clinical Managements: Clinical, Orthopedic, and Related Research). (15 pgs) A summary/overview presentation of 5augmentative modes of communication for severely physically involved individuals. This was prepared as an introduction for individuals not familiar with the field but interested in a short overview of key issues. This paper includes SELECTING APPROPRIATE COMMUNICATION AND CONTROL AIDS: A PARALLEL PROFILE APPROACH.

Initiating Communication Systems for Severely Speech-Impaired Persons. L. Bottorf and D. DePape. Published in Topics in Language Disorders, March, 1982. (16 pgs.) Describes the goals of an effective augmentative communication program facilitating interaction between nonspeaking clients and their environments. Diagnostic intervention techniques, assessment of present strategies, and standardized assessment tools are discussed.

Non-Vocal Communication Techniques and Aids for the Severely Physically Handicapped. Edited by G.C. Vanderheiden and K. Grilley. Based upon transcriptions of the 1975 Trace Center National Workshop Series on Non-Vocal Communication Techniques and Aids. Designed for clinicians and teachers, this book forms an introductory text and sourcebook summarizing information on non-vocal communication aids and techniques that have been developed and applied around the world.

The Rehabilitation Aids Resource Book: Telecommunication, Monitoring, and Environmental Control Currently being prepared by the Trace Center, 314 Waisman Center, University of Wisconsin, 1500 Highland Avenue, Madison, WI 53705.

These publications, and a list of other Trace publications, can be obtained from the Trace Center Reprint Service, Waisman Center, 1500 Highland Avenue, Madison WI 53705, 608/262-6966.

Writing & Typing

Aids for Handicapped Learners. Reference and Information Section, Division for the Blind and Physically Handicapped, Library of Congress, Washington DC 20542. Devices and techniques for handling books, writing, and typing. Free.

IBM's Handicapped Purchasing Program offers rebuilt, used typewriters at a low price to individuals having a letter from their doctor indicating they are disabled and would receive therapeutic benefit from a typewriter. Call your local IBM or write to IBM, 10100 Santa Monica Blvd., Suite 2100, Los Angeles, CA 90067, attn. Dave Kelley.

"Non-Conversational Communication Technology Needs of Individuals with Handicaps." G. Vanderheiden. Rehabilitation World, Vol. 7, No. 2, Summer 1983. $.60. Six basic areas of concern are described as encompassing the full spectrum of communication needs for the severely physically handicapped person. A review of current technology available to meet address these needs, and a vision of future developments, is presented.

INTERNATIONAL SOCIETY FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (ISAAC)

ISAAC is a new organization (formed in May, 1983) bringing a unique focus to the field of augmentative and alternative communication. Through its publications, conferences, and scientific meetings, ISAAC will keep its members abreast of the latest developments in the field.

ISAAC is the only organization whose sole focus is the advancement of the transdisciplinary field of Augmentative and Alternative Communication techniques and aids. ISAAC will facilitate an exchange of information and focus attention upon the work being done to help people with communication difficulties throughout the world.

ISAAC's membership is international, and includes all those interested in augmentative communication: users and potential users of communication systems and devices; professionals from the field of speech pathology, education, occupational and physical therapy, social work, linguistics, engineering, computer science, medicine, psychology and others; family, friends, and community members wishing to support the communication of those using augmentative and alternative communication systems and devices. The ISAAC membership chairperson is Susan Sansone, c/o NY State Association for the Help of Retarded Children, 2900 Veterans' Memorial Highway, Bohemia, NY 11716. Contact Tamara Redburn, Secretary/Treasurer, at the Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824, for information on membership outside North America. All members of ISAAC receive a one-year subscription to Communication Outlook, which is the official ISAAC newsletter. Members will also be entitled to a special reduced subscription rate of $10 to Communicating Together, a quarterly publication of the Blissymbolics Communication Institute (BCI).

ISAAC will produce several publications: a registry of ISAAC members and others concerned about or working in the area of augmentative and alternative communication; a quarterly journal, Augmentative and Alternative Communication, D. Yoder, editor, Williams & Wilkins, publishers (first issue January 1985); and proceedings of the biannual conference.

An international conference will be held every two years. The first conference will be held October 18-20, 1984, at the Massachusetts Institute of Technology in Cambridge, Massachusetts. The 1986 conference will be held in the United Kingdom. Other conferences, institutes, and workshops will be scheduled in the future. Further information will appear in future issues of Communication Outlook.

Also see Confer in INFORMATION RESOURCES, p. 14.

GUIDES TO COMMUNICATION AIDS

Communication Enhancement Bibliography, compiled by Donald Rabush, Coordinator of Special Education at Western Maryland College, Lyle Lloyd, Professor and Chairman of Special Education at Purdue University, and Michael Gerdes, undergraduate Research Assistant at Purdue University, 1982. 758 entries, annotated. $10.00-$23.00. Available in computer diskette form for the Apple II or TRS-80 Model III microcomputers. Readers of Communication Outlook can obtain bound print copies of the bibliography for $15. Communication Outlook will publish yearly updates of the bibliography at an additional cost. Availability of these inserts will be announced in each Fall issue.

All recent papers, books, proceedings, etc., concerned with communication enhancement will be included in the updates. If you know of any publications which should be included, please send the publication or a complete citation of it to Communication Outlook.

Address all orders, additions and corrections to Communication Outlook, Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824-1042.

Comparative Chart of Commercially Available Communication Aids is presently available from Prentke Romich Company (PRC). The chart was developed by Arlene Kraat and Marsha Sitver of the Augmentative Communication Program, Queens College, Flushing, N.Y., and funded by PRC.

The chart features communication aids currently available and distributed in the U.S. Aids are divided on the chart into portable and non-portable, and further into categories of scan, direct selection, and scan/direct selection. Features of the aids are classified by selection technique, language content, standard communication outputs, optional outputs available, power used, weight and size, rental possibilities and price range. Many of the devices are pictures, and all of the manufacturers' addresses are listed. A glossary of terms is included at the bottom of the chart.

Single copies of the chart are available at no cost from PRC. Multiple copies are available at a cost of $1 each for printing, postage and handling. For further information, contact Prentke Romich Company, 8769 Township Road 513, Shreve, OH 44676.

SELECTED PUBLICATIONS

"In the past 10 years, there has been a virtual explosion of information and equipment available for the development of nonverbal communication systems for severely disabled individuals. The field has grown from an isolated specialty area of several disciplines into an integral multidisciplinary component of rehabilitation programs. Fortunately, several excellent texts on nonverbal system selection and implementation have been recently published -- e.g., Silverman (1980) and Musselwhite and St. Louis (1982). In addition, Communication Outlook, a publication focusing on communication aids and techniques, has become an effective vehicle for updating the rapid advance of technology in this area." James Heller, Rehab Literature, November, 1983, p. 364.

Books

Communication for the Speechless. F.H. Silverman. Englewood Cliffs, New Jersey: Prentice-Hall, 1980.

Communication Programming for the Severely Handicapped: Vocal and Non-Vocal Strategies. C.R. Musselwhite and K.W. St. Louis. College Hill, San Diego, CA, 1982.

Communication Systems for Severely Handicapped Persons. Brenda C. Fairweather, Donna H. Haun, and Louis J. Finkle. Charles C. Thomas, Springfield, IL. 102 pp, figures. 1982. "...Fairweather, Haun and Finkle present a his torically incomplete approach to non-verbal commu nication system selection. Although their description of switches is clear and relatively current, their evaluation of technical systems has already been dated by the rapid advance of techno logy. This text is best utilized as one of many resources for nonverbal system selection." (James H. Heller, Rehabilitation Literature, November- December 1983, Vol. 44, No. 11-12)

Directory of Telecommunication Aids for Disabled People. Prepared by Bell Canada, on behalf of the Canadian Telecommunication Carriers Assn., Ottawa, Ontario, Canada. This directory of telecommunication aids is intended to be a quick reference for people who are concerned with the telecommunications of hard-of-hearing, deaf, speech impaired, visually-impaired and motion handicapped people. An attempt has been made to compile the information which is available for various sources both in North America and abroad.

The devices are categorized by the function which they perform in relation to telecommunications, especially with reference to the telephone. Each aid is described briefly. Its manufacturer, distributor or contact is listed; and its approximate price, when available, is recorded. Research which is known to be currently underway for developing more aids related to these functions is also briefly outlined. Following this list of aids and research, some existing services relating to telecommunications for disabled people are discussed.

NonSpeech Language and Communication: Analysis and Intervention. Language Intervention Series, Volume IV. Richard Schiefelbusch, Editor. University Park Press, 233 East Redwood Street, Baltimore, MD. 529 pages. 1980. This book examines a wide range of issues relating to language and communication to find viable alternatives for children who cannot speak. It takes a broad look at communication functions and presents models and strategies for developing alternatives for impaired individuals.

Making the important point that communication without speech is better than no communication at all, the chapter authors discuss the design of other ways that will enable children to enjoy the benefits of communication, enhance cognitive development, extend social participation, and strengthen their eventual economic well-being.

For some individuals, an alternative symbol system will facilitate the attainment of far more complex and more standard forms of communication, including speech. For others, the alternative mode will provide a way into a subculture, into a learning environment, into human fellowship, or into a new world of human dignity. It offers specialists in communication a deeper understanding of symbolic processing, as well as specific reviews of research into nonspeech communication.

The book is based on invited papers given at The Nonspeech Language Conference held at Gulf Shores, Alabama, in March, 1977, and is considered by many to be a classic in the field.

See also Publications Available from the Trace Center on page 204.

Periodicals

Communication Outlook. Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824. Subscriptions $10.00 ($12.00 outside North America) for whole volumes (4 issues); $3.00 for single copies. Communication Outlook is a quarterly newsletter addressed to the community of individuals interested in the application of technology to the needs of persons who experience communication handicaps due to neurological or neuromuscular conditions; edited and published jointly by the Artificial Language Laboratory, Michigan State University, and the Trace Center for the Severely Communicatively Handicapped, University of Wisconsin. It is the principal publication of the International Society for Augmentative and Alternative Communication (ISAAC).

Medical World News: The Newsmagazine of Medicine, Vol. 23, No. 13, June 21, 1982. 211 E. 43 Street, New York, NY 10017. This issue carried two articles on technology for rehabilitation; "For the Disabled: New Voices, New Freedom," and "Computers May Let Two Quadriplegics Walk in This Summer's Sunshine."

Rehabilitation World, Summer, 1983. Available from Rehabilitation International USA, 1123 Broadway, New York, NY 10010, 212/620-4040. This issue devoted to communication aids for people with speech impairments. In this special issue, experts in a number of communication-related areas probe new technological possibilities, from keyboard-operated speaking systems to simple microphones. Many of the articles are supplemented with photographs and other illustrations, and even some of the technically oriented advertisements may be found informative.

Articles include the following: "Communication Disabilities -- An Overview," Bruce Baker, pp. 3-7; "Non-Conversational Communication Technology Needs of Physically Handicapped Individuals," Gregg Vanderheiden, pp. 8-13; "Impressions of Eulenberg," John F. Moses, pp. 14-19; "Unspoken Barriers," Jeffrey J. Moyer, pp. 20-22; "Aids to Communication: A British Perspective," Robert Fawcus, pp. 23-25; "Diplomacy's End," Michael B. Williams, p. 26; "Communication for Access," Lucy C. Spruill, p. 27; "Communication Outlook," Tamara Redburn, pp. 28-31; "A Personal View," William L. Rush, pp. 32-39; "Nonspeech Communication: A Position Statement, from the American Speech-Language-Hearing Association," pp. 40-43; "Talking Computers Enhance Careers of Blind People," John M. Williams, pp. 53-56.

Seminars in Speech and Language, Volume 5, Number 1, February, 1984: Augmenting Language Skills with Microcomputers. Laura F. Meyers, Ph.D., Guest Editor. Available from Thieme-Stratton, Inc., 381 Park Avenue South, New York, NY 10016. Articles includes: "Computer Enhancement of Message Formulation and Presentation for Communication Augmentation System Users," David R. Beukelman, Ph.D., and Kathryn M. Yorkston, Ph.D.; "Using Microcomputers in the Diagnosis and Treatment of Chronic Aphasic Adults," Richard C. Katz, Ph.D.; "Unique Contributions of Microcomputers to Language Intervention with Handicapped Children," Laura F. Meyers, Ph.D.; "An Environmental Approach to Delivery of Microprocessor-Based and Other Communication Systems," Jane Mills, MA, CCC, and Jayne Higgins, MA; "Fostering Progress in Literacy Development: Technology and Social Interaction," Teresa J. Rosegrant, Ph.D.; "Technology Needs of Individuals with Communication Impairments," Gregg C. Vanderheiden.

Audiovisuals

Breaking Through the Wall. Gordon News Film. Available from HC Electronics, Inc., 250 Camino Alto, Mill Valley, CA 94941. 16mm, color, 14 minutes. 1979. Shows the application of the Phonic Mirror Handi-voice, a synthetic speech output communication aid for those without speech, e.g. people with severe cerebral palsy.

Finding a Voice. Martin Freeth, WGBH-Boston. Available from Time-Life Video, 100 Eisenhower Drive, Paramus, NJ 07652. 3/4" videocassette, color, 60 minutes. 1982. A WGBH-Boston/NOVA program about the development of electronic aids for the communications-impaired population. Concentrates on the visit of an Englishman with cerebral palsy, Dick Boydell, to the Artificial Language Center in East Lansing, MI. Under the supervision of the Center's Director, John Eulenberg, appropriate technology for Mr. Boydell and others is devices. Second prize, 1982 International Rehabilitation Film Festival in Technical Aids.

Nonspeech Communication: Augmentative Systems. Videotape, color, 330 minutes. 1981. Presented by Macalyne Fristoe and Lyle L. Lloyd, Purdue University. Produced and distributed by Purdue University; Continuing Education Business, Rm. 110 Stewart Center, Purdue University, West Lafayette, IN 47907. Presents information concerning the use of manual signs and gestures, graphic representations such as Rebuses, Blissymbols, and communication prostheses, ranging from picture arrays to sophisticated electronic devices.

To Say I Am!. KOCE-TV, California. Distributed by Lawren Productions, Inc., 12121 Pinewood Drive, PO Box 666, Mendocino, CA 95460. Severely handicapped children who are also without speech are shown using an array of electronic and mechanical communication devices which enable them to learn and "talk" with friends.

227

SERVICE CENTERS

These are some agencies that can provide assessment and other services in the area of communication and control for people with physical disabilities. No endorsements are implied by inclusion on this list. If you have information to add to, change, or delete from this list, please send it to the RESNA Sourcebook editor.

California

Assistive Device Center
Calif. State University Sacramento
6000 "J" Street
Sacramento, CA 95819
(916) 454-6601
Contact: Colette Coleman, PhD, Director

Blissymbolics Resource Center
Dept. of Speech and Language Development
Loma Linda University Medical Center
Loma Linda, CA 92354
(714) 824-4401
Contact: Melvin S. Cohen, PhD, Director

Children's Hospital and Health Center
Speech, Hearing and Neurosensory Center
Speech-Language Pathology Department
8001 Frost Street
San Diego, CA 92123
(619) 292-3482
Contact: Chris Hagen, PhD, Director

Children's Hospital at Stanford
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, CA 94304
(415) 327-4800, ext. 345

Daniel Freeman Hospital
Communication Disorders Department
333 N. Prairie Avenue
Inglewood, CA 90301
(213) 674-7050, ext. 3328
Contact: Jane Bensussen, Director

Friends of Handicapped Children
UCLA Foundation
23-10 Rehabilitation Center
1000 Veteran Avenue
Los Angeles, CA 90024
213/825-4821.

Glendale Adventist Hospital
Non-Speech Communication Program
1509 Wilson Terrace
Glendale, CA 91026
(213) 240-8000, ext. 416
Contact: Beth Pioli, Director

Non-Verbal Communication Center
Los Angeles Unified School District
c/o Widney High School
2302 S. Gramercy Place
Los Angeles, CA 90018
(213) 732-1976
Contact: Mary Knerl, Teacher Advisor

Northridge Hospital Medical Center
Innovative Communication Aids for
the Non Verbal (ICAN)
183200 Rosco Blvd.
Northridge, CA 91328
Contact: Gail L. Pickering
Program Coordinator

Rancho Los Amigos Hospital
Communication Disorders Department
7601 East Imperial Highway, Bldg. 900
Downey, CA 90242
(213) 922-7682
Contact: Frank DeRuyder, PhD, Director
Adult Eva. Contact: Diane Bangar
Ped. Eval. Contact: Linda Lafontaine

Florida

The Communication Systems
Evaluation Center
1600 Silver Star Roadd
Orlando, FL 32804
(305) 293-0473 or 291-7469
Contact: Patty Smith, CSEC Coordinator

Blissymbolics Resource Center
Forrest Park School
1600 Silver Star Road
Orlando, FL 32804
(305) 293-5841
Contact: Sandra Osborn, Principal
(Blissymbols Teacher)

Illinois

Alan J. Brown Center for Alternative Communication
and Environmental Control
Rehabilitation Institute of Chicago
345 East Superior Street
Chicago, IL 60611
(312) 649-8560
Contact: Ken Kozole

Indiana

Ft. Wayne State Hospital & Training Center
4900 St. Joe Road
Ft. Wayne, IN 46815

Kansas

Cerebral Palsy Research Foundation
of Kansas, Inc.
Post Office Box 8217
2021 Old Manor
Wichita, KS 67208
(316) 688-1881

Maryland

United Cerebral Palsy of Central Maryland
Non-Vocal Communications Aid Equipment
Delrey Preschool
18 Delrey Avenue
Catonsville, MD 21228
(301) 744-3151
Contact: Noreen Rysticken

Massachusetts

Massachusetts Hospital School
Adaptive Equipment
Canton, MA
(617) 828-2440
Contact: Carol Sargent, OTR

Children's Hospital Medical Center
Communication Enhancement Clinic
300 Longwood Avenue
Boston, MA 02115
(617) 735-6000
Contact: Howard C. Shane, PhD.

Tufts-New England Medical Center
Special Equipment Clinic
171 Harrison Avenue
Boston, MA 02111
(617) 956-5622
Contact: Dr. Bruce Gans

Michigan

Communication Enhancement Center
Learning Assessment Clinic
Oakland Schools
2100 Pontiac Lake Road
Pontiac, MI 48054
Contact: Nathaniel Peters, Director
(313) 858-1943
Ina Kirsten, Clinician
(313) 858-1901

Communication Enhancement Program
Jackson County Intermediate School Dist.
6700 Browns Lake Road
P. O. Box 1160
Jackson, MI 49204
(517) 787-2800
Contact: Dianne Taulbee, Supervisor

Communication Enrichment Resource Center (CERC)
Northville Public Schools
405 W. Main Street
Northville, MI 48167
Contact: Mark Miko, Program Admin.
(313) 349-3400, ext. 277
Contact: John Smallwood, Classroom Eng.
(313) 349-6210, artif. lang. lab.

PAM Assistance Center
110 Marshall Street
P. O. Box 21037
Lansing, MI 48090
(517) 371-5897

Minnesota

Cambridge Area Developmental Rehabilitation and Education (CADRE)
430 N. W. 8th Street
Cambridge, MN 55008
(612) 689-4466 (afternoons)
Contact: Mary Ruprecht

Courage Center
3915 Golden Valley Road
Golden Valley, MN 55422
(612) 588-0811

New Jersey

Cerebral Palsy Association of Middlesex County
Roosevelt Park, Oak Drive
Edison, NJ 08817
Contact: Ms. Travis M. Tallman, CCC-SP
Director, Speech Pathology

Communication Technology Center
P. O. Box 4111
Atlantic City, NJ 08404
(609) 345-5191
Contact: Joan Bruno, MS, CCC
Chief Speech Pathologist

New York

The Burke Rehabilitation Center
785 Mamaroneck Avenue
White Plains, NY 10605

Cerebral Palsy Center
Scheier Communication Unit
1603 Court Street
Syracuse, NY
Contact: Carol Cohen, Director
(315) 455-5726

Ohio

Prentke Romich Company
8769 Twp. Road 13
Shreve, OH 44676
(216) 567-2906
Contact: Susanne Shealey, OTR
Director, Client Services

Oregon

Good Samaritan Hospital
Portland, OR

Tennessee

University of Tennessee
Rehabilitation Engineering Center
682 Court Avenue
Memphis, TN 38163
(901) 528-6445
Contact: Elaine Trefler, OTR

Texas

Callier Center for Communication Disorders
1966 Inwood Road
Dallas, TX 75235
(214) 783-3033
Contact: Delva Culp

Education Service Center, Region 20
Augmentative Communication Evaluation System
1314 Hines Avenue
San Antonio, TX 78208
(512) 828-3551
Contact: Patricia Wasson

Washington

University of Washington Hospital
Department of Rehabilitation Medicine
1959 N. E. Pacific Street
Seattle, WA 98199
(206) 543-3674
Contact: Dave Beukelman, PhD

Wisconsin

Communications Aids and Systems Clinic
S-120 Waisman Center
1500 Highland Avenue
Madison, WI 53706
(608) 263-2522

Canada

Augmentative Communication Service
Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1E8
(416) 425-6229
Contact: Penny Parnes, Director

The Kinsmen Rehabilitation Foundation
Technical Aids Program
Vancouver, British Columbia
(604) 734-8841

NONSPEECH COMMUNICATION ADVOCACY ORGANIZATIONS

Arkansas

Evelyn G. Albritton
Speech & Hearing Clinic
University of Arkansas at Little Rock
33rd & University
Little Rock, AR 72204
(501) 569-3155

California

Bay Area Non-Oral Communication Group
c/o Marywin Deegan
4802 Lawton Avenue
Oakland, CA 94609

San Diego Non-Oral Advocacy Group
c/o Nany Oro
United Cerebral Palsy center
7947 Birmingham Drive
San Diego, CA 92123
(619) 278-5420

Southern California Communication Group
8114 West 83rd Street
Playa Del Rey, CA 90293

Idaho

Idaho Nonvocal Group
Susan Lijegreen
Department of Speech Pathology & Audiology
Idaho State University
Box 8116
Pocatello, ID 83209-0009
(208) 236-3495

Massachusetts

Northeast Communication Enhancement Group
Box 268
Brookline, MA 02146-0268

Michigan

Michigan Association for Communication Enhancement
c/o Ina Kirstein
Learning Assessment Clinic/Communication
Enhancement Center
Oakland Schools
2100 Pontiac Lake Road
Pontiac, MI 48054
(313) 858-1901

Parent Advocacy Group
6700 Browns Lake Road
P. O. Box 1160
Jackson, MI 49204
Contact: Lucylee Neiswander-Whiting

Nebraska

Nebraska Advocacy Services
Lincoln Center Building
215 Centennial Mall, South
Room 422
Lincoln, NE 68508
(402) 474-3183

New Jersey

New Jersey Augmentative Communication Task Force
c/o Joan Bruno
Children's Seashore House
4100 Atlantic Avenue
Atlantic City, NJ 08404
(609) 345-5191

New York

Buffalo Augmentative Communication Group
c/o Cheryl Rogers, LSP/Speech Department
United Cerebral Palsy Association
of Western New York
31 Rosslor Street
Cheektowaga, NY 14225
(716) 897-1351

METRO I CAN
c/o Roslyn Holliday Moore
116-39 167 Street
Jamaica, NY 11434

Non-Vocal Communication Group
of Greater New York
19-10 Parsons Boulevard
Whitestone, NY 11357
Contact: Arlene Kraat
(212) 520-7358

North Carolina

Ninevah Murray
Speech/Language programs
Division for Exceptional Children
State Department of Public Instruction
Raleigh, NC 27611
(919) 733-3004

Ohio

Great Lakes Communication Enhancement Group
Fran Watkins
795 Burnside Drive
Tipp City, OH 45371

Oregon

Pacific Northwest Non-Vocal Communication Group,
Portland Chapter
P. O. Box 1065
Portland, OR 97207

Pennsylvania

Pittsburgh Communication Enhancement Group
c/o Marie Capozzie and Jacky Territo
Pioneer School
Dunster and LaMoine Streets
Pittsburgh, PA 15226
412/531-0626

Texas

Augmentative Communication Task Force
c/o Delva Culp, Speech-Language Pathologist
Callier Center for Communication Disorders
1966 Inwood Road
University of Texas at Dallas
Dallas, TX 75235
(214) 783-3137

Non-Oral Communication Advocacy Group
4339 El Campo
Fort Worth, TX 76107

Washington

Pacific Northwest Non-Vocal
Communication Group (PNWNVCG)
Louise Gooch, President
10545 Meridian Avenue Northeast
1-302
Seattle, WA 98133

Canada

Blissymbolics Communication Institute
Ontario Crippled Children's Centre
Penny Parnes
350 Rumsey Road
Toronto, Ontario
CANADA M4G 1R8

Communication Awareness & Action --
Toronto Region
c/o Lynette Norris
78 Glentworth Drive
Willowdale, Ontario
CANADA M2J 2E8

Hamilton Wentworth Communication Collective
c/o Barbara Rush
64 Magnolia Drive
Hamilton, Ontario
CANADA L9C 5T2

All groups are urged to add these addresses to their mailing lists. Groups wishing to add, delete, or change their names or addresses should write to Judy Montgomery, James H. Cox School, 17615 Los Jardines East, Fountain Valley, CA 92708. Ms. Montgomery writes an ADVOCACY UPDATE column in Communication Outlook.

SOME COMMUNICATION AID MANUFACTURERS

Abbey Medical
8004 Westchester Pike
Upper Darby, PA 19082
215/789-5220

Adaptive Communication Systems, Inc.
P.O. Box 12440
Pittsburgh, PA 15231
412/264-2288

American Communications Corporation
180 Roberts Street
East Hartford, CT 06108
203/289-3491

C-Phone
553 Wolfner
Fenton, MO 63026
314/343-5883

Canon, Inc.
7-1 Nishi-Shinjuko
2 Chome
Shinjuko Daie Iehi Seinel Bldg.
Shinjuko-ku
Tokyo, JAPAN

also: Canon
c/o Telesensory Systems, Inc.
455 N. Bernardo
Mountain View, CA 94043
415/960-0920

Chailey Heritage School & Hospital
Rehabilitation Engineering Unit
North Chailey, Lewes
East Sussex BN8 4EF
ENGLAND
082-572-2112

Cleo Living Aids
3957 Mayfield Road
Cleveland, OH 44121
216/382-9700

Communications Research Corporation
1720-130th Avenue NE
Bellevue, WA 98005
206/881-9550

Computers for the Physically Handicapped, Inc.
Department RB
7602 Talbert #5
Huntington Beach, CA 92647
714/848-1122

Contemporary Artistic Technology
P. O. Box 58430, Station L
Vancouver, BV V6P 6K2
604/324-8119

Crestwood Company
P.O. Box 045313
Milwaukee, WI 53207
414/351-0311

Developmental Equipment
981 Winnetka Terrace
Lake Zurich, IL 60047
312/438-3476

Dufco
2410 Broad Street
San Luis Obispo, CA 93401
805/541-5022

Educational Microcomputer Systems
1 Clear Spring
Irvine, CA 92715
714/553-0133

Executive Distributors of America, Inc.
15055 32 Mile Road
Romeo, MI 48065
313/752-3518
313/237-0554 (Detroit)

Foundation for Communication for the Disabled
31 Southampton Row
London WC1B 5HJ
ENGLAND
Ph. 01-405-1019

Genelex, Inc.
64 Gough Avenue
Ivyland, PA 18974
215/672-6643

Handicapped Children's Technological Services
Box 64
Foster, RI 02825
401/822-4622

Handicapped Educational Learning Products, Inc.
P.O. Box 9763
Sacramento, CA 95823
916/451-9654

INNOCOMP Innovative Computer Applications
1121 Vegas Court
Charlottesville, VA 22901
804/924-3781

IOR Enterprises
229 Harrison Avenue
Highland Park, NJ 08904
201/846-5200

Jim's Instrument Manufacturing, Inc.
P.O. Box 5157
Coralville, IA 52241
319/351-3429

Kahlstrom, Gunnar
Barkspadevagen
S-752 47 Uppsala
SWEDEN

Krown Research, Inc.
6300 Arizona Circle
Los Angeles, CA 90045
213/641-4306

Medelec, Limited
Manor Way
Old Woking, Surrey GU22 9JU
ENGLAND
Ph. Woking (04862) 70331

Micro Communication Devices
12388 Priscilla Lane
Los Altos Hills, CA 94022
415/981-5588

National Association for the Deaf
814 Thayer Avenue
Silver Spring, MD 20910

Oskar Foundation
Halfeiken 11
3956 VT Leersum
THE NETHERLANDS
Ph. 03434-2013

Phonic Ear, Inc.
250 Camino Alto
Mill Valley, CA 94941
415/383-4000

Phonic Ear, Limited
7475 Kimbel St. Unit #10
Mississauga, Ontario L5S 1E7
CANADA
415/677-3231
415/677-3035

Plantronics, Inc.
345 Encinal Street
Santa Cruz, CA 95060
408/426-5858
TWX 910/598-4415
Telex 357419

PMV Systems B.V.
Post Box 16
4273 ZG Hank
THE NETHERLANDS
016/22-2958

Possum Controls Limited
82 Birch Avenue
Little Silver, NJ 07739
201/842-1246

Prentke Romich Company
8769 Township Road 513
Shreve, OH 44676-9146
216/567-2906

J.A. Preston
60 Page Road
Clifton, NJ 07012
800/631-7277

Rehabilitation Products Limited
UK Distributors for Akron Bridge Works
Hasketon, Woodbridge, Suffolk IP1 6HF
ENGLAND
Grundisburgh (047 335) 475

Rikscentralen
Bracke Ostergard
S-417 22 Gothenburg
SWEDEN

Scitronics
523 S. Clewell Street
P.O. Box 5344
Bethlehem, PA 18015
215/868-7220

SFERE Projekt B.V.
P.O. Box 16
4273 ZG Hank (NB)
THE NETHERLANDS
Ph. 016/22-2958

SHARP Electronics Corporation
Consumer Calculator Division
10 Sharp Plaza
Paramus, NJ 07652
201/265-5600

SI/COMM
7475 Whitlock Avenue
Playa del Rey, CA 90291
213/823-1202

Sontek Medical, Inc.
Sontek Industries, Inc.
P.O. Box 549
Lexington, MA 02173
617/863-1410

Specialized Systems, Inc.
6060 Corte del Cedro
Carlesbad, CA 92008
619/438-8800
TTY 619/481-6060

TASH, Inc.
2075 Bayview Avenue
Toronto, Ontario
416/486-3569

Technical University of Denmark
Electronics Laboratory
Building 344 DK-2800
Lyngby, DENMARK
Ph. 45 2 88 15 66

Telegraphics
P.O. Box 1061
Carrollton, TX 75006
214/492-1629

Texas Instruments
Educational Division
P.O. Box 10508
Lubbock, TX 79408
800/858-1802

Toby Churchill, Ltd.
Designers of Equipment for the Disabled
20 Panton Street
Cambridge CB2 1HP
ENGLAND

Trendcom
311 Turquoise Street
Milpita, CA 95035
408/943-1970

Tufts-New England Medical Center
171 Harrison Avenue Box 1014
Boston, MA 02111
617/956-5000

Typewriting Institute for the Handicapped
3102 W. Augusta Avenue
Phoenix, AZ 85021
602/939-5344

Ultratec, Inc.
P.O. Box 4062
Madison, WI 53711
608/273-0707

Words+, Inc.
1125 Stewart Ct., Suite D
Sunnyvale, CA 94086
408/730-9588

ZYGO Industries, Inc.
P.O. Box 1008
Portland, OR 97207-1008
503/297-1724

Research & Development Organizations

NIHR supports the following centers in the area of nonvocal communication.

Medical Rehabilitation R&T Center
Tufts University
171 Harrison Avenue (Box 1014)
Boston, MA 02111
617/956-5031
Richard Foulds, Project Director
Core area: Communication Systems for Individuals with Nonvocal Disabilities

Trace R&D Center
314 Waisman Center
1500 Highland Avenue
University of Wisconsin-Madison
Madison, WI 53705
608/262-6966
Gregg C. Vanderheiden, Project Director
Core area: Access to Communication, Control, and Information Processing Systems

A list of other research organizations can be found in this section on page 202.

SENSORY AIDS

TECHNOLOGY FOR PEOPLE WITH IMPAIRED VISION

SELECTED PUBLICATIONS

Aids and Appliances Review is a quarterly journal that provides high quality information on technology that is useful to people with impaired vision. Each issue discusses one topic in depth. The first twelve issues have covered:

1. Sunglasses	January 1979
2. Large Print Media	July 1979
3. Handwriting Guides	January 1980
4. Speech Compression	December 1980
5. Alternative Labels: Aids for Independent Living	December 1981
6. Diabetic Control: Equipment for Use with Vision Loss	June 1982
7. The Light Probe: A Versatile Aid	Winter 1982
8. Kitchen Aids: Resources for the Visually Impaired	Spring 1983
9/10. Voice Output for Computer Access	Fall 1983
11. Braille and Computers	Winter 1984
12. Job Modifications: Case Presentations of Job Modifications Through Adaptive Equipment	Spring 1984

The next two will cover:

13. Aids for the Visually Impaired Elderly	Summer 1984
14. Tactile Maps	Fall 1984

These publications are a valuable source of information, as they are designed to be a consumer report on aids and appliances for visually impaired people. The Review is available in print for free, or on tape in the Library of Congress format. For a taped copy, send one C-90 blank cassette to the AAR Editorial Office at the address below. Contact the AAR Editorial Office and ask to be included on their mailing list. Available from: Aids and Appliances Review, The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158, 617/969-6200.

Aids for the 80s: What They Are and What They Do. C. Michael Mellor. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. 1981. Free.

Braille Research Newsletter is a periodic newsletter devoted to providing state-of-the-art information on the production and use of the Braille reading system throughout the world. The Newsletter reviews new equipment, discusses new or innovative programs, described the results of Braille-related research projects, and provides resource listings of manufacturers of various Braille devices. Issue #14 contains such technology-related articles as "Cognitive Processes in Braille Reading," "Telebraille: The New Telecommunication System for Deaf-Blind People," "Tactile Diagrams," "Braille Stereotypes and Duplicators" and others. Each issue is $6 (specify print or Braille), available from National Braille Press, Inc., 88 St. Stephen Street, Boston, Massachusetts 02115.

Journal of Visual Impairment & Blindness, February 1983, Vol. 77, No. 2. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011, 212/620-2000. This issue of the Journal has several articles regarding technology for visually impaired persons: "The Night Vision Aid for Legally Blind People with Night Blindness: An Evaluation," written by Diane L. Morrissette, Ph.D., and Gregory Goodrich, Ph.D., in which the Night Vision Aid and the Wide Angle Mobility Light are compared and evaluated; "AFB's Computerized Travel Aid: Two Years of Research and Development," by Mark M. Uslan, W. Robert Smith, Kenneth Schreibman and Douglas R. Maure, in which the progress in developing the aid is described; and "Reading Machines for Blind People," by Derek H. Fender, which discusses the problems of providing blind people with practical verbal reading machines.

Low Vision Services. American Foundation for the Blind, 15 West 16th St., New York, NY 10011. $2.00.

Reading Aids for the Partially Sighted: A Systematic Classification and Procedure for Prescribing. Louise Sloan. Williams & Wilkins, Baltimore, MD. 150 pages. $12.95. 1977. Criteria for selecting and evaluating optical and non-optical reading aids. Illustrations accompany many of the descriptions.

Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. Available in large print and Braille editions. $7.50. 1978. Lists devices and equipment which provide on-the-job assistance to visually impaired people. Each entry describes the function of the device, employment application, vendor, availability, and, in some instances, price. Listings include hard copy and paperless braille devices, braille readout, tone output or voice output calculators, computer terminals and accessories, labeling aids, measuring aids, communication devices, etc. Indexed by employment area.

"Sensory Aids for Visually-Impaired Clients." Rehab. Brief, November 1982, 5:11. Many of the difficulties experienced by persons with visual disabilities are met by technology in the form of sensory aids. This issue looks at sensory devices, techniques, and systems, primarily within the context of aids that will be of particular help on the job. Available from: U.S. Department of Education, Office of Special Education and Rehabilitative Services, Mail Stop 2305, Switzer Building, Washington, DC 20202.

Sensory Aids Technology Update is a monthly newsletter on technology and employment issues concerning disabled people. This new publication is a rich source of information on technology applications. It is particularly valuable to people looking for information on sensory aids (hearing and vision), but is also useful for other types of technology. It has features on new products, special employment, education and training programs, unusual applications of technology, and new developments in research. New publications and interesting audiovisual programs are regularly reviewed, and each month the product comparison section profiles similar devices. It includes new from overseas. The articles are concise, and include references to guide you to further information. A typical issue includes: **Accessing dedicated word processors**: what works, what doesn't, and what's coming; **Financing adaptive aids**: with government funds fading, where to look for money; **Project Partnership**: what it promised and what it delivers; **Equipment demo centers for hearing impaired**: where they are in the U.S.; **Apple software customized for speech output** in project for S.F. Bay Area blind children; **Tacti-Phone**: new device lets deaf-blind talk on standard phone; **Reader's Forum**: advice on recruiting disabled college students (December, 1983). A one-year subscription to Update is $30.00; available from Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306.

Smith-Kettlewell Technical File, a quarterly technical journal for blind and visually impaired readers, is available from the Smith-Kettlewell Eye Research Foundation. This do-it-yourself magazine is based upon the concept that given the proper tools and knowledge of exemplary prototype assistive devices, persons who are blind can become involved in solving some of the problems they face. The journal provides its readers with information such as: electronics and radio theory; data on integrated circuits; instructions for constructing devices designed by the Rehabilitation Engineering Center located at the Smith-Kettlewell Institute for Visual Sciences; available electronic test equipment; hints on soldering and the use of power tools; and related bibliographies produced in Braille, large print, and recorded form by various organizations. The Technical File is available for $15.00 per year (Braille or large print edition), and $8.00 per year (Talking Book version). Available from: Smith-Kettlewell Institute of Visual Sciences, Rehabilitation Engineering Center, 2232 Webster Street, San Francisco, CA 94115, 415/563-2323.

Visual Aids and Informational Material. National Association for Visually Handicapped. New York, NY.

Vocational and Educational Aids Developed by the Rehabilitation Engineering Center at the Smith-Kettlewell Institute of Visual Sciences. Second edition, 1983. 32 pages. 2232 Webster Street, San Francisco, California 94122.

PRODUCT CATALOGS

Aids and Appliances for the Visually and Physically Disabled, Independent Living Aids, Inc., 11 Commercial Avenue, Plainview, NY 11803.

International Guide to Aids and Appliances for Blind and Visually Impaired Persons, American Foundation for the Blind, 15 West 16th Street, New York, NY 10011.

Products for People with Vision Problems. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011. Annually, in print and braille editions. Free. A guide to products for blind and visually impaired people. Includes watches, clocks and timers, canes and accessories, products for recreation, kitchens, household, sewing, medical use, writing and communication, and mathematics. Lists low vision products, tools and instruments, and travel concessions and programs. Five sources of product information indexed by product. Contains photographs.

Vision Aids Resource Guide, Science Products, (Wayne) Box A, Southeastern, Pennsylvania 19399, 800/233-3121 (in Penn., 800/222-2148). This catalog has been developed to serve as a complete resource guide for the visually impaired consumer or professional in the field of the visually impaired. It includes a wide selection of products from hand-held magnifiers and monoculars to Macular Degeneration Reading Aids, and talking clocks, calculators, and computers.

AUDIOVISUALS

Dark Silence. United States Social Rehabilitation Services. Distributed by National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington, DC 20409. 16mm, color, 12 minutes. 1975. Reports on the research programs of the National Center for Deaf-Blind Youths and Adults in New Hyde Park, NY. Features new communications hardware for the deaf/blind.

The Handicaps of Blindness and Deaf-Blindness. CBS-TV and St. Johns University. Distributed by Mr. Winston Kirby, Director, Television Center, Grand Central Parkway, Jamaica, NY 11439. 3/4" video, color, 28 1/2 minutes. 1979. Discussion of blindness with Dr. Hellinger, depicting different visual handicaps; illustration of devices to aid the visually handicapped, an introduction to deaf-blindness and the Helen Keller National Center, and an interview with Dr. Smithdas, the Director.

Reading Aids for the Blind: Kidsworld #135 Story. Bob and Betsy Behrens. Distributed by The Behrens Company, Inc., 170 SE 14th Street, Suite 6, Miami FL 33131. 3/4" videocassette, color. 4:31 minutes. 1981. Kidsworld is a half-hour weekly television news program made for and by kids and telecast in over 90 U.S. cities. In this segment, Sherrie Liu reports on reading aids at the Maryland School for the Blind. Second Prize, Series, 1981 International Rehabilitation Film Festival.

237

OTHER RESOURCES ON SENSORY AIDS FOR VISION

Organizations

American Foundation for the Blind
15 West 16th Street
New York, New York 10011

American Printing House for the Blind
1839 Frankfort Avenue
Louisville, KY 40206

Carroll Center for the Blind
770 Centre Street
Newton, MA 02158
617/969-6200

Information for the Partially Sighted (IPS)
9012 Old Georgetown Road
Bethesda, Maryland 20814

Sensory Aids Foundation
399 Sherman Avenue
Suite 12
Palo Alto, CA 94306
415/329-0430

National Institute of Handicapped Research (NIHR) Supported Organizations

RECs

Rehabilitation Engineering Center
Smith-Kettlewell Institute of Visual Sciences
2232 Webster Street
San Francisco, California 94115
415/563-2323
Development and evaluation of sensory aids for blind and deaf individuals
Dr. Arthur Jampolsky
Dr. John Brabyn

Research and Training Centers

Pennsylvania College of Optometry
Office of Academic Development
1200 W. Godfrey Avenue
Philadelphia, Pennsylvania 19141
215/424-5900, ext. 252
Orientation and mobility research for persons with low vision
Laura Edwards, project director

Mississippi State University
P.O. Drawer LQ
Mississippi State, Mississippi 39762
601/325-2001
Blindness and low vision rehabilitation
William H. Graves, Ph.D., project director

Western Pennsylvania School for Blind Children
201 N. Bellefield Street
Pittsburgh, Pennsylvania 15213
412/621-0100.
Assessment and treatment of families with visually handicapped children.
Janet Simon, project director

National Library Service for the Blind and Physically Handicapped

Library of Congress
1291 Taylor Street NW
Washington, DC 20502
202/287-5100

The National Library Service for the Blind and Physically Handicapped (NLS) collection of full-length braille and talking books and magazines is loaned free to individuals who cannot hold, handle, or read conventional printed matter. Books, magazines, and playback equipment provided by NLS are distributed through a national network of 160 locally funded cooperating libraries and agencies where they are circulated to eligible residents of the U.S. and its territories.

The NLS Reference Section provides information on various aspects of blindness and physical handicaps. Its reference collection consists of approximately 4,000 print books and 500 professional journals dealing with handicaps and related subjects. Information on aids and appliances is included as one of the many topics covered in the reference section. Specific reference circulars and bibliographies are available on reading and writing aids for the handicapped, reading machines for the blind, and closed-circuit reading devices for the visually impaired.

See also: **PERSONAL MOBILITY "Mobility Aids for the Blind"; MICROCOMPUTER APPLICATIONS, "Access for Blind People"; HOMEMAKING; RECREATION.**

DO-IT-YOURSELF TECHNOLOGY FOR BLIND PEOPLE

"Known affectionately to its graduates as the 'little school,' the Smith-Kettlewell Institute of Visual Sciences in San Francisco is offering a free electronics assembly class. Open to all blind or visually impaired people, positions are available for three students on a first-come, first-served basis.

"Unique in the United States, the 'little school' provides pre-vocational instruction in soldering, parts layout and hardware mounting. Twenty-five students have participated in the program since it began in 1980. There is no formal certification upon completion of training. Assistance is available for finding living accommodations. For more information, contact the program director, Jay Williams, at 2232 Webster Street, San Francisco, California 94115, 415/561-1677."

from Sensory Aids Technology Update, November, 1983.

Home Mechanics for the Visually Impaired. R.G. Utrup. Western Michigan University, Department of Blind Rehabilitation, Kalamazoo, Michigan 49001. 96 pages. $1.50. 1974. Series of 17 lessons for teaching blind students to make their own home repairs. Supplementary reading list included.

TECHNOLOGY FOR PEOPLE WITH IMPAIRED HEARING

EQUIPMENT DEMONSTRATION CENTERS

"The growing availability of assistive devices for the hearing impaired makes it increasingly difficult for consumers and rehabilitation professionals to determine what devices might be most helpful.

"In the last two years, several centers have been established in the U.S. offering hands-on demonstrations to help consumers and professionals assess different devices. There is no charge for visiting these centers. In addition to the working models of equipment, all of them provide up-to-date information on device prices and availability.

1st U.S. Center

"The Fort Lauderdale Oral School pioneered the first such center in 1981. More than 20 devices, including vibrating and visual alarms, captioning devices and Telecommunication Devices for the Deaf (TDDs), are set up for display and demonstration. The center is open on Tuesdays and Thursdays and tours are led by people trained in the use of each device. For more information contact The Fort Lauderdale Oral School, 3100 S.W. 8th Ave., Fort Lauderdale, Florida 33315, (305)525-7251.

California Center

"In Northern California, The San Francisco Hearing Society's Lions Den Project offers hands-on demonstrations of various devices, including TDDs. A trained audiologist, who can explain the devices, guides visitors through the display. Since it has no regular scheduled hours, make appointments ahead of time by calling (415)775-5700, or with a TTY (415)776-DEAF.

New York Centers

"In New York City, the New York League for the Hard of Hearing accepts appointments for demonstrations of many devices, including alarms, listening devices and TDDs. They also dispense devices. To make an appointment call (212)741-7640, with a TTY (212)255-1932; or write the New York League for the Hard of Hearing, 71 West 23rd Street, New York, New York 10010.

"The National Institute for the Deaf in Rochester, New York houses another demonstration center. The Institute has an extensive telephone laboratory where TDDs and other phone devices can be examined. In a separate hearing lab, signaling devices are on display. A trained staff member takes visitors through the displays. To arrange a demonstration call Dr. Diane Castle (716)475-6476 or Jackie Gauger (716)475-6553.

Home Setting

"The Hearing and Speech Agency of Metropolitan Baltimore has organized a unique demonstration center that simulates a home setting. The display area is arranged like a living room. Evelyn Burns, the center director, believes it is important to try a device in the environment in which it will be used. (She even taped a baby crying to help test warning devices.) At the moment, they do not have a TDD to demonstrate. The center is open on Tuesdays, but special appointments can be arranged by calling in advance. An interpreter is available to guide deaf visitors. For more information contact Evelyn Burns, Hearing and Speech Agency of Metropolitan Baltimore, 2220 St. Paul Street, Baltimore, Maryland 21218, or call (301)243-3800, with a TTY (301)243-2672.

Northwest Center

"In the Northwest, the Seattle Hearing and Speech Center schedules device demonstrations by appointment. Clock timers, pillow buzzers, bed vibrators, amplifiers, and TDDs are on display. Many devices can be bought at the center. For more information call Rose Dias (206)323-5770."

This article appeared in the December 1983 issue of Sensory Aids Technology Update, which is available from Sensory Aids Foundation, 399 Sheridan Avenue, Palo Alto, CA.

DEAFNET

"The Word's Getting Around: Local Implementation of Telecommunications Networks for Deaf Users." American Annuals of the Deaf, September, 1983 Volume 128, No. 5, pages 613-618. Accessible by both telecommunication devices for the deaf (TDDs) and ASCII-based computer terminals, DEAFNET is the communications network for deaf persons. It provides bulletin-board access, electronic message service, and real-time linking capabilities for deaf users, their hearing friends, businesses, and various services.

DEAFNET is scheduled to be up and running in the 20 largest U.S. cities by 1985.

For more DEAFNET information, contact:

Teresa Middleton
415/859-2236 (voice)
415/326-1802 (TTY)
SRI International
Menlo Park, California

PUBLICATIONS RELATED TO TECHNOLOGY FOR PEOPLE WITH IMPAIRED HEARING

A Survey of Current Developments in Assistive Devices for Hearing-Impaired Persons in the United States. George W. Fellendorf, Ed.D. 71 pages. $5.00. 1982. Gallaudet Research Institute, Office of Research Dissemination, House Three, Gallaudet College, 800 Florida Avenue NE, Washington, DC 20002. This report is a current summary and information source for the field of assistive devices for the deaf and hearing impaired. It is intended primarily for professionals but will also be useful to consumers. Assistive devices are broadly defined to range from simple visual "doorbells" to teletypewriters to advanced concepts such as computer mail and automatic speech recognizers. Existing devices are described in the following classes: alerting and alarm systems, telephone assistive systems, personal listening systems, captioned TV, and large-room amplification systems. Descriptions are functional, in terms of the consumer-community and client needs, rather than in technical terms. In addition to existing devices, prototype new devices and trends in research and development are discussed; these include concepts such as Picturephone, computerized teletext services, speech synthesis, and speech recognition systems. Device demonstration centers and other methods of dissemination of devices for the hearing impaired are presented as models for meeting the consumer's needs to obtain and try out devices. Studies of consumer needs, preferences, and actions are summarized (nine studies are covered: 1974-1982). Recommendations are made for future action to improve and develop further devices and to provide better education, cooperation of the concerned parties and dissemination of assistive devices. An appendix lists representative devices that are currently available, their price, and sources of supply.

Other Publications of Interest

Advances in Prosthetic Devices for the Deaf: A Technical Workshop. D. McPherson, M. Davis, editors. National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161. 334 pages. $7.50. 1979. Examines 45 topic areas dealing with amplification, cochlear implant, vibrotactile devices and the physiology and psychoacoustics of hearing and hearing impairment. It also examines the social and educational aspects of deafness.

Assistive Listening Devices and Systems (ALDS) And You. Dr. Gwenyth Vaughn, Robert K. Lightman, Rocky Stone. SHHH/AD, 4848 Battery Lane, Suite 100, Bethesda, Maryland 20814. A six pamphlet series with information and illustrations of hard-wire, infrared, FM and loop systems available from SHHH. Titles are: I. Screen Yourself for an Assistive Listening Devices or System (ALDS); II. How You Can Select an Assistive Listening Devices or System (ALDS); III. Telephone Listening and Talking; IV. Listening to Television, Radio, Stereo; V. Special Techniques for One-to-One and Small Group Listening and Talking: Automobile, Restaurant, Industry, Clinic, Conference, Party, Exhibit; VI. Medium and Large Area Listening: Conferences, Classrooms, Places of Worship, Theaters, Out-of-doors.

"Contributions of Technology to Deaf and Hearing-Impaired Individuals." Rehab Brief: Bringing Research Into Effective Focus, Vol. III, No. 11, August 20, 1980. National Institute of Handicapped Research, Office of Special Education and Rehabilitative Services, Department of Education, Washington, DC 20201. No charge.

Directory of Telecommunication Aids for Disabled People. Prepared by Bell Canada on behalf of the Canadian Telecommunication Carriers Assn. A reference for people who are concerned with the telecommunications of hard-of-hearing, deaf, speech-impaired, visually-impaired and motion handicapped people. An attempt has been made to compile the information which is available for various sources both in North America and abroad. The devices are categorized by the function which they perform in relation to telecommunications, especially with reference to the telephone. Each aid is described briefly. Its manufacturer, distributor, or contact is listed; and its approximate price, when available, is recorded. Research which is known to be currently underway for developing more aids related to these functions is also briefly outlined. Following this listing of aids and research, some existing services relating to telecommunications for disabled people are discussed.

Equipment Designed to Improve the Communication Skills of the Deaf.. Donald Johnson, William E. Castle, editors. National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161. 77 pages. $7.50. 1976. This booklet presents equipment designed and developed at the National Technical Institute for the Deaf, Rochester Institute of Technology, to improve communication skills of the deaf. The report includes seven chapters demonstrating the actual design and rationale for development of several items of equipment and their related work space.

Getting the Most Out of Your Hearing Aid. Joan M. Armbruster and Maurice H. Miller. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 40 pages. $2.00. 1981. This is a step-by-step guide to living with your hearing aid. It covers the components of a hearing aid, how to wear an aid, how to get accustomed to your aid, common solutions to common complaints, and hints on basic care for hearing aids.

"Help for Hearing Impaired Persons." PAM Repeater, No. 18, June 1983. Barbara Warren. Arselia S. Ensign, Editor. PAM Assistance Center, 601 W. Maple Street, Lansing, MI 48906, 517/371-5897.

Helpful Hearing Aid Hints. Earl Harford and Elizabeth Dodds. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 21 pages. $1.75. 1970. How to achieve maximum benefit from hearing aids and overcome common communication problems. For adult hearing aid users.

Helping the Handicapped: A Guide to Aids Developed by the Telephone Pioneers of America. Telephone Pioneers of America, 195 Broadway, New York, NY 10007. Call your local phone company for the name of your local area chapter administrator.

Learning Technology and the Hearing Impaired. Frank B. Withrow, Ph.D., editor. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 106 pages. $4.95. 1981.

New Trends for Instructing Deaf People. Rochester Institute of Technology, National Technical Institute for the Deaf, One Lomb Memorial Drive, P.O. Box 9837, Rochester, New York 14623.

Non-Vocal Communication Resource Book. G.C. Vanderheiden, L. Krause. $20.00. 1983. Trace R&D Center, Reprint Service, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53705, 608/262-6966.

Orientation to Hearing Aids. Jaclyn S. Gauger. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. $9.45. 1978. This package was developed to motivate and train students to use hearing aids to improve communication skills. It is designed as an individualized instruction guide for a hearing aid user and audiologist. Written at an eighth grade vocabulary level, the package includes the following six component workbooks: Hearing Aids and What They Do (46 pages); Earmolds and Hearing Aid Batteries (32 pages); Maintenance and Care of Hearing Aids (26 pages); Troubleshooting Hearing Aid Problems (22 pages); Consumer Information: Hearing Aids (32 pages); Student Manual (20 pages).

Reasonable Accommodation Handbook. Frank Bowe. American Telephone & Telegraph Company. Available from: National Center for a Barrier Free Environment, Information Service, 1015 Fifteenth Street NW, Washington, DC 20005, 202/466-6896. 323 pages. $37.50. 1983. Although produced for AT&T, this document would also be helpful to other employers and vocational counselors. It contains an introductory section discussing the concept of reasonable accommodation and reviewing the legal and regulatory requirements. The book provides one-page descriptions, with photographs, of hundreds of products and devices which may prove suitable for use as reasonable accommodations for certain individuals having job-related limitations. The following information is entered for each product or service for which it was available: product name, what it is, what it does, advantages, disadvantages, cost, available from, Bell System experience, photograph. The data are accurate as of June, 1982.

Sensory Devices for the Hearing Impaired. Harry Levitt, James M. Pickett, and Robert A. Houde, editors. IEEE Press. John Wiley & Sons, Inc. 1980.

Signaling Devices for Hearing-Impaired People. Diane L. Castle, Ph.D. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. Free. This brochure provides information on commercially available products that perform signaling functions for the hearing-impaired person such as wake-up alarms, multi-purpose signaling devices and warning devices.

Special Devices for Hard of Hearing, Deaf, and Deaf-Blind Persons. J. Hurvitz and R. Carmen. Little Brown, and Company, Boston, MA. 1981.

Telephone Accessories You Can Build. J.H. Guilder. Hayden Book Co., Inc., Rochelle Park, NJ. 1976. Has information on building your own signaling devices.

"What You Should Know About TDDs." Diane Castle, Ph.D. Public Information Office, National Technical Institute for the Deaf, Rochester Institute of Technology, One Lomb Memorial Drive, P.O. Box 9887, Rochester, NY 14623. free.

Children's Hearing Aids

"All About Hearing Aids". Auditory Services Program, Montgomery County, Maryland, Public Schools. Available from: A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 12 pages. $1.75. 1975. Simple instructions for parents and teachers on the care of a child's hearing aid.

Hearing Loss, Hearing Aids and Your Child: A Guide for Parents. Alfred L. Miller. Charles C. Thomas, 2600 S. First Street, Springfield, IL 62717. 97 pages, figures. $7.50. 1980. A discussion of the various forms of hearing loss, procedures for evaluating hearing, descriptions of hearing aids, and provisions of speech and hearing therapy in regular schools.

Tim and His Hearing Aid. Eleanor Ronnei and Joan Porter. A.G. Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 48 pages. $3.50. 1965. An easy-to-read book for elementary school children about a young boy learning to use a hearing aid. Illustrated.

Audiovisuals

Communication Aids for the Hearing Handicapped. R.L. Hughes, Ph.D., M.E. Glasscock III, MD. Distributed by House Ear Institute, Audio Visual Services, 256 South Lake Street, Los Angeles, CA 90057. 16mm and video. 15 minutes. 1970. There are many devices other than hearing aids that the hearing impaired person may be able to use. The electronic stethoscope, television and telephone aids, and various light signals are presented in simulated situations to illustrate such devices.

O.U.T.: Organization for the Use of the Telephone. WBAL-TV, Baltimore. Distributed by the Organization for Use of the Telephone, Inc., PO Box 175, Owings Mills, MD 21117. 3/4" videocassette, color. 30 seconds. 1981. Information to assist hearing-impaired people with hearing aids in the use of the telephone.

Silent Walls. United States Social Rehabilitation Services. Distributed by National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington DC 20409. Examines deafness and the many problems of deaf people who must adjust to a silent world. Shows the training of deaf people

to communicate, to find employment, and to bridge the gap of isolation and alienation. Demonstrates new office equipment designed especially for the deaf by deaf persons.

ORGANIZATIONS

National organizations that can provide more information:

Alexander Graham Bell Association for the Deaf
4317 Volta Place, NW
Washington, DC 20007
202/337-5220 (Voice or TTY)

Gallaudet College
800 Florida NE
Washington, DC

National Association of the Deaf (NAD)
814 Thayer Avenue
Silver Spring, Maryland 20910
301/587-1788 (Voice or TTY)

National Technical Institute for the Deaf
Rochester Institute of Technology
One Lomb Memorial Drive
P.O. Box 9887
Rochester, New York 14623

Organizations for Use of the Telephone, Inc.
P.O. Box 175
Owings Mill, Maryland 21117
301/655-1827

SHHH/AD
4848 Battery Lane
Suite 100
Bethesda, Maryland 20814

Programs Funded by National Institute for Handicapped Research

Rehabilitation Engineering Center for the Deaf and Hearing Impaired
Gallaudet Research Institute
Gallaudet College
800 Florida Avenue, NE
Washington, DC
202/651-5440
Raymond Trybus, Ph.D., Project Director

Rehabilitation Engineering Center on the New Generation hearing Aids
The Lexington Center, Inc.
30th Avenue and 75th Street
Jackson Heights, New York 11370
Alan Lerman, Ph.D., Project Director

Rehabilitation Engineering Center on Sensory Aids for Blind and Deaf
Smith-Kettlewell Institute of Visual Sciences
2232 Webster Street
San Francisco, California 94115
Dr. Arthur Jampolsky, Dr. John Brabyn, Project Directors

University of Arkansas
Board of Trustees
Fayetteville Campus
Fayetteville, Arkansas 72701
Douglas Watson, Ph.D., Project Director
Core Area: Improving Vocational Rehabilitation in Postsecondary Education Programs for Deaf Individuals

University of Arkansas College of Education
Fayetteville, Arkansas 72701
501/371-1654, TTY 501/371-1656
Douglas Watson, Ph.D., Project Director
Core Area: Vocational Rehabilitation of Individuals with Deafness/Hearing Impairments

TELECOMMUNICATION DEVICES FOR THE DEAF (TDDs)

Telecommunication Devices for the Deaf (TDDs) are growing in popularity daily. A TDD lets a deaf person make a telephone call directly to another person having similar equipment, without the need for an interpreter, since the conversation is typed through one machine to another machine instead of being spoken.

Some Sources for TDDs

American Communication Corp.
180 Roberts Street
East Hartford, Connecticut 06108
Voice and TDD: 203/289-3491

C-Phone, Inc.
553 Wolfner Drive
Fenton, MI 63026
Voice and TDD: 314/343-5883

CYBERTECH, Inc.
P.O. Box 543
Thornhill, Ontario
CANADA L3T 4AZ
Canadian TDD

Krown Research, Inc.
6300 Arizona Circle
Los Angeles, California 90045
Voice and TDD: 213/641-4306

Northern Telecom, Inc.
Advanced Telephone Products Division
640 Massman Drive
Nashville, Tennessee 37210
Voice 615/883-9220
TDD 615/889-1627

Phone-TTY Incorporated
202 Lexington Avenue
Hackensack, New Jersey 07410
Voice and TDD 201/489-7889

Plantronics
345 Encinal Street
Santa Cruz, California 95060
Voice and TDD 408/462-5606

Specialized Systems, Inc.
11339 Sorrento Valley Road
Dept. TBJ
San Diego, California 92121
Voice 714/481-6000
TDD 714/481-6060

Ultratec, Inc.
P.O. Box 4062
Madison, WI
Voice and TDD 608/273-0707

Weitbrecht Communications, Inc.
655 Skyway, Suite 230
San Carlos, California 94070
Voice 415/592-1622
TDD 415/592-1623

For more information on TDDs, contact Telecommunications for the Deaf, Inc. (TDI), 814 Thayer Ave, Silver Spring, MD 20910, 301/589-3006 (voice/TDD).

A Service for TDD Users

Even if the other person doesn't have a TDD, you can still communicate using your TDD. There are several new services around the country which help make the connection. TDD users call the service which connects (on a second line) by voice to the called party. Both lines are kept open simultaneously, so that a complete two-way conversation may take place quickly and easily. The service operator reads the calling party's typing on a TDD unit; the called party then hears the service operator's voice reading and responds in speech, which the service operator then types on a TDD for the calling party to read. The same service, in reverse order, may also apply for persons calling someone who uses a TDD device. Most services are operated by voluntary organizations and do not charge a fee. The only costs are the regular telephone charges between the TDD user and the service, and between the service and called party. However, in some areas, these services are run on a monthly fee-for-service basis.

Assessment of TDD Technology

Applied Concepts Corporation has been awarded a research control by the U.S. Architectural and Transportation Barriers Compliance Board to help the Board complete its minimum guidelines for TDD use in federal facilities. One of the purposes of the study is to provide the Board with an assessment of present and future technologies for use in TDDs. A report should be available in the fall of 1984. For more information on the project, contact Sally Free, Office of Technical Services, Architectural and Transportation Barriers Compliance Board, 330 C Street, SW, Washington, DC 20202, 202/472-2700 (voice or TDD).

Also see **COMMUNICATION** and **EDUCATION & VOCATIONAL TECHNOLOGY**.

Microcomputer Applications

MICROCOMPUTER APPLICATIONS 227

INTRODUCTION 227

GENERAL GUIDELINES FOR SELECTING A COMPUTER 227

COMPUTER SHOPPING FOR THE BLIND CONSUMER 228

AN ISSUE OF ACCESS 230

COMPUTER-RELATED INFORMATION FROM TRACE 232

USING A COMPUTER WHEN YOU CAN'T USE ITS STANDARD KEYBOARD 233

SOURCES FOR MORE INFORMATION ON MICROCOMPUTER APPLICATIONS FOR DISABLED PEOPLE 236

PUBLICATIONS 236
CLEARINGHOUSES & CATALOGS 237
NEWSLETTERS 238
MASS MARKET COMPUTER MAGAZINES 238
CONFERENCE PROCEEDINGS 239
INFORMATION EXCHANGE NETWORKS 241
RESOURCES FOR SPECIAL APPLICATIONS 243
IN SPECIAL EDUCATION 243
IN COGNITIVE REHABILITATION 244
VOICE INPUT 245
VOICE OUTPUT 245
COMPUTER ACCESS FOR BLIND PEOPLE 246

TRACE CENTER SOFTWARE/HARDWARE REGISTRY FORMS 247

INTRODUCTION

"A group of statisticians once rated the efficiency of various species in motion. They used the criterion: 'Which one can get from point A to point B with the least amount of energy exerted?'

"The condor won. The human being came in about a third of the way down the list.

"Then the scientists re-rated each species, but this time put the human on a bicycle. Suddenly, we humans were twice as efficient as the condor.

"Personal computers can work the same way as the bicycle -- as amplifiers of human ability.

"There are an estimated 20 million people in the United States with some disabling physical handicap. Of that number, 7.9 million are severely disabled. The numbers are great, but each disability is unique -- because each person is unique.

"Although an ideal computer system for the disabled doesn't exist, the pieces, and the knowledge necessary to assemble a computer system to meet specific needs do exit.

"By improving the applications that exist today, we can develop the personal computer into a more powerful tool for everyone."

> From the Introduction to: Personal Computers and the Disabled, A Resource Guide, Apple Computer, Inc., Cupertino, CA 95014.

In the not too distant future, it will be strange to look back on this section called "Microcomputer Applications" and wonder why a separate section was pulled out of the other function-oriented areas in this book. It will probably look as peculiar as if there had been a section on the use of books, or applications of paper and pencil. In 1984, however, we are not yet ready to position information on computers solely within their functional application areas, e.g., environmental control, education, worksite. The field is too new, the potentials not fully understood, and we are still learning -- how, when, where, why -- to use this new tool effectively. These tools may even make our traditional functionally separate categories obsolete (home, work, play, etc.) More likely, though, computers will slip into the background and become like the motor vehicle, a part of every aspect of our lives.

We are all influenced by this new technology. Whether we are enthusiastic, intimidated, or just confused, the computer is here to stay.

Even if you are diligently trying to ignore them, it is becoming increasingly difficult to avoid the references to computer applications for just about everyone and everything.

Disabled people, special education and rehabilitation are obvious areas which can benefit from microcomputer applications. There has been an explosion in the number of workshops, conferences, publications, hardware and software developed and targeted at the disability market. Even so, the need is far from satisfied.

The potential and range of applications is mind boggling! For example, at a recent conference in California, "Software for the Handicapped and Vocational Rehabilitation," the range of presentations included:

- Single Switch Training and Software for the School Age Population
- A Computer Assisted Communication System for Aphasic Adults
- Vocational Considerations for Application to Computer Technology
- Environmental Control Systems
- Software Applications for Multiply Handicapped School Age Children -- Group Problem Solving and Social Interaction
- Robotics
- Computer Access by Voice Recognition
- Software for Traumatic Head Injury

GENERAL GUIDELINES FOR SELECTION OF COMPUTERS

"When trying to select a computer for a given application, there are a number of considerations. Actual purchase of the computer is generally the last rather than the first step in this process. The recommended procedure is as follows:

1. What do you want the computer to do?
"Very carefully define exactly what it is that you want the computer to achieve. 'I want it to help him with his schoolwork', 'I want it to help him write', 'I want it to help him communicate', are not sufficient definitions of need. These are general goals or wishes, but not specific functions that you wish the computer to achieve. 'I would like the computer to provide him with some mechanism for printing out messages', 'I would like it to provide a mechanism for him to write out his homework, making corrections, both at home and at school', or 'I would like it to provide my blind son with the ability to write out work and be able to detect and correct his mistakes both at home and at school' are better definitions of needs. In making your description of the needs, use as many paragraphs as necessary, and be as absolutely explicit as possible.

2. Is there a simpler alternative?
"When exploring solutions to your problem, look at both computer-based and non-computer-based techniques or approaches to the solution. Also look at technology- and non-technology-based solutions. Often, a simple strategy or technique may be a more powerful and more flexible solution than the electronic or computer-based aid.

3. Is appropriate software available?
"No computer is of any value without software. The next step should therefore be to identify whether software exists, for any computer, which will provide the functions desired. Carefully examine any software packages available to see

whether they provide all of the functions required, or whether they will need modification. Modification to software can be extremely expensive, or impossible, depending upon the complexity of the program, the language it's written in, and the availability of the source code. Writing a program from scratch can be very expensive. A program which could be purchased for $50-$100 may cost $20,000-$200,000 to write. Many of the more expensive programs may have cost $500,000-$1,000,000 to develop and perfect.

4. Does the software really do what you want it to?
"Get hold of the software packages (or hardware modifications) and try them out. Many pieces of software sound good when described, but fail to deliver much when actually tried. Also, it is very easy to have over-optimistic expectations of the value of computers in carrying out various tasks. A good demonstration of the software in use can reduce many of these problems, and help to identify truly useful software packages or hardware modifications/modules.

5. Which hardware does it run on?
"If the software is available for multiple computers, evaluate the various computers to determine which one would be the best for your particular application. The physical characteristics of the computer, its specific features and capabilities, the likelihood that additional software in this area will be developed for each computer, and the availability and maintenance of the computer locally are all factors which should be taken into account.

6. How can I compare them?
"If several computers appear to be equally good, some type of a scoring cross-comparison may be useful. The individual items discussed would be listed, along with a notation as to whether they were absolutely required, highly desirable, desirable, or optional. The various computers can then be compared. Any computer which fails to provide an absolutely required item would be automatically disqualified. Points could then be scored for the other items, and the systems compared against each other in this manner.

7. Is the solution adequate?
"Check to be sure that the solution is sufficient. Just because you have identified the best of the computer/software packages available does not guarantee that you have a package which is good enough to meet your particular needs or to justify the expenditure. In some cases, it is wiser to wait for additional developments than to move immediately and purchase something which in fact will not meet your needs.

8. Have I got all the pieces?
"Finally, when you have identified a package which is both optimal and sufficient, proceed to purchase all of the components required. When comparing different computers, be sure to compare the entire package price. Often, a computer will look to be less expensive, but its cost will rapidly rise as all of the various accessories and modules are secured to complete the system.

"Throughout the process, remember that a little extra legwork on the front end can prove invaluable in the final selection. Also, if you do not see a piece of hardware or software that really meets your needs, do not be afraid to hold off and wait for developments. The field at this time is expanding very, very rapidly. New hardware and new computers are constantly being announced. New programs and special modifications are also being developed in the area of rehabilitation. Check summary documents such as the Trace Center International Software/Hardware Registry of Programs Written or Adapted for Handicapped Individuals to see what programs/ modifications are available or under development in your area. A short note to some of the principal developers in the area to ask whether they are aware of any new research or aids may also be helpful in identifying new software packages or special hardware adaptations which are still in development stages and not yet documented."

> Excerpted from: Comparison of Apple, Epson, IBM ... Microcomputers for Applications in Rehabilitation Systems for Persons with Physical Handicaps 1984, Trace Research & Development Center, University of Wisconsin-Madison, $8.50.

The complete document also includes the following information:

a) an overview of considerations regarding the use of microcomputers with/by handicapped individuals.
b) a cross-comparison of computers and their features.
c) a cross-comparison of different sized system configurations for each computer.
d) a discussion of the different computers in terms of the considerations discussed under (a) above.
e) a comparison sheet for evaluation of your own needs.

COMPUTER SHOPPING FOR THE BLIND CONSUMER

Know what you want to do:
"...What are your intended applications? There are no universal solutions. You choices in software, assistive aids, and the computer, all depend absolutely on the intended application. Don't shop the computer first and then look for something it can do.

Talk to blind users:
"If you know what you want to do, talk to blind users doing the same thing. This is the hard part. Unless you have a blind friend who uses computers, you'll probably need help. To start, call manufacturers and distributors of software and aids specifically designed for blind users and ask for names of their customers. Local and national organizations that work with visually impaired people, many VA hospitals, and even some computer user groups can prove good resources.

"A number of newsletters regularly print detailed product comparisons, evaluations, and reviews of unusual computer applications for blind users. In addition to Update, some of the better ones are by David Holloday (717)523-6739, Joe Giovanelli (Blind Apple Users Group) (516)433-0171, Vito

Proscia (415)965-8102 and COPH-2 (312)477-1813. Two recent books on the subject have been published by the Carroll Center for the Blind (617)969-6200 and the National Braille Press (617)266-6160.

The local computer store:
"Be wary of advice from the local computer store. They will rarely have any knowledge about software for blind users, or be able to answer questions on interfacing assistive aids with the computer. And if you haven't done your homework, many computer sales types can easily overwhelm and confuse you with their technical jargon. The same advice is true for computer-literate, sighted friends. They will generally be interested in the latest state-of-the-art advances and consider obsolete the machine that may be best for your purposes.

First find the software:
"Software is the brain of the machine; it makes the computer do what you want. After talking to other blind users, you should know what your software choices are, as well as the available aids you may need and the computers they interface with.

"Here are some dangers to be aware of. Line-oriented displays software that displays information left-to-right on a line as opposed to full screen) often requires line-oriented computer aids (called serial). And sometimes software is protected* so it will only read directly to the computer monitor, thus bypassing your voice output synthesizer or braille device. So make sure your software can be intelligibly read by your assistive aids and computer. In many cases you won't be able to use commercial software such as VisiCalc, or word processing packages that have full screen editing features.

"Finally, equipment interfacing (connecting different pieces of hardware to the computer) is an onerous bogeyman that haunts all computer users. Again, as with software, make sure your assistive aids and peripheral devices all connect to the computer and each other.

Try before you buy:
"This will be difficult, but before buying, arrange a demonstration of the system you've chosen, including all software and aids. This may mean traveling, but remember, you're considering an investment of $3000 to perhaps more than $20,000. Some organizations (see the November Update) are now, or will soon be, offering hands on demonstrations of computer access aids. Also contact vendors of special equipment for blind users; they can sometimes assemble a local demonstration not only of their device but of the other hardware you want to try.

Watch where you buy:
"Stay with reputable, known dealers. At the same time, of course, price is a very important consideration. Fortunately blind consumers today breathe a much more bracing, competitive air than in the past. There are many good software packages, voice output devices, braille printers, and modified computers offered by healthy, young firms that should be considered. Blind consumers are no longer hostages to a handful of high-priced manufacturers competing in a small marketplace.

"With that said, make sure your vendor offers support for its product. Ask for the names of several customers and investigate the firm. The support should include service assistance (local, factory and telephone hot-line), regular product updates, and a new product warranty, followed by a reasonably-priced service contract. For more information, see this issue's 'Buyer Beware' article."

Reprinted with permission from "Sensory Aids Technology Update", January, 1984.

*Editor's note: I asked Gregg Vanderheiden to comment on the problem of protected software. His reply was:

"Protection of software itself does not usually cause this problem. Protection is only one of 6 or more possible causes for this, and is usually not the culprit. This problem is just as common in unprotected high speed software. Some causes are:

"1) Software bypass of operating system to gain speed.
2) New patch needed for program wipes out your patch.
3) All memory is used leaving no room for your patch.
4) Software just assumes empty computer and kills patch by accident.
5) Software clears out computer to make sure other patches from old program are removed so user won't have trouble using this program.
6) Software clears out other programs and patches to help protect this program from being copied."

Another somewhat longer article on computer selection for blind people, entitled "How to Select a Computer," by Harvey Lauer, appears in the COPH Bulletin, Vol. XIX, No. 7, 1st Quarter 1984, Issue 50.

Also refer to the reference books in this section.

AN ISSUE OF ACCESS

IN: CURBCUTS AND COMPUTERS: PROVIDING ACCESS TO COMPUTERS AND INFORMATION SYSTEMS FOR DISABLED INDIVIDUALS

Gregg Vanderheiden, Trace R&D Center, raises the disturbing issue of how computers could become the greatest new handicap that disabled people will ever face.

He points out that computers have the very great potential of creating new barriers and widening the gap between disabled and able-bodied people, rather than helping the disabled individual overcome these gaps.

"How does a computer become a barrier? First, we have to realize that the computer was not invented for the individual with a disability. We get so excited about all of the potential uses of the computer to carry out special activities for individuals who have disabilities that we forget that the reason computers were developed, and the reason the technology is racing ahead and the prices are dropping, is that they are very rapidly being applied and incorporated into the lives of non-handicapped individuals. They are extending the capabilities of able-bodied individuals, increasing their efficiency and effectiveness, and providing them with new capabilities. Computers are showing up at an ever-increasing rate in our educational system. Soon there will be computers in all classrooms, and they will be used as routinely as blackboards and pencils and paper are today. Similarly, employers are making more and more extensive use of computers in all aspects of employment. Even in daily life, we may soon be doing most of our ordering and bill-paying using computer terminals and the like from our homes. In all of these cases, however, the software is being written to be operated by individuals who have use of all senses and fingers. As such, they are for the most part unusable by individuals who have various types of physical disabilities. Thus while we are busy providing handicapped individuals with ways of using a computer to act like a typewriter, pencil and paper, or environment control system, to parallel the manual activities of non-handicapped individuals, the rest of society is busy moving on to the next generation where many of these activities will be carried out much more efficiently and effectively in totally different ways using computer technology. Moreover, these new ways are designed to make maximum use of all of the senses and movement patterns of able-bodied individuals, and may thus exclude many handicapped individuals.

"So, while the computer is advancing handicapped individuals two steps through the use of special programs designed for handicapped individuals, the computer is advancing everyone else in society five steps. Moreover, the five steps are being designed in such a way that the handicapped individual often can not take advantage of them, thereby leaving them actually three steps behind.

"For example, we now find bright physically handicapped individuals being placed in the classroom, where half of the classwork is being done on computers. Although these handicapped individuals have the few special programs which have been written for them, and which they can operate with their limited physical abilities, they are unable to use the much larger (on the order of a hundred to a thousand times larger) body of standard software which is being used by the rest of their class, since they are physically unable to operate it. As a result, half of the classwork (and the educational system) is inaccessible to them.

"Other individuals, moving into the job market, find that companies are not interested in the fact that these handicapped individuals can use their own computer and their specially adapted programs. The employer is only interested in whether the disabled individual is able to operate the accounting program running on the company's computer. If not, then he can't carry out the job, and is unemployable, despite the fact that he has a computer and a program he can operate. Care must be to taken to distinguish between having the ability to do something or operate a computer and the ability to operate the programs and computers that are required. This is roughly akin to being able to easily access your bathroom at home, which does you little or no good if you cannot use the facilities on the job. It's not enough that you can access a bathroom -- you have to be able to access the bathrooms that are in the environments where you need to operate.

"Even in the home, however, this problem can arise. As we move toward telecommunication systems where ordering and bill-paying is carried out through specialized communication links, it will become necessary for the handicapped individuals to operate the specific keypads or control panels on these automatic home communication systems. If standard computer terminals were used, then a specially adapted 'terminal for the handicapped' might be usable. More likely, however, due to security and other considerations, very specialized systems will be used. Then, what could have been a very powerful capability for handicapped individuals (remote ordering and billpaying) will instead be available only to non-disabled individuals.

"Thus, although custom software programs can provide a great number of very useful capabilities to handicapped individuals, custom software is not enough. Access must be provided to the world of standard computers and, most importantly, to the world of standard software, if computers are in fact to result in a net gain for handicapped individuals.

"The first method that comes to mind for providing access to standard software is to simply modify the software so that it can also be used by handicapped individuals. However, this is an extremely difficult proposition, even when support from the original software developers is available. Again, for security and commercial reasons, most standard software is a carefully guarded and protected commodity, making modification almost impossible. Moreover, the software programs are continuously updated and revised, making it impossible to keep

handicapped users supplied with a modified version. It should be remembered that modifying a single program can cost between $8,000 and $20,000; writing a program from scratch can cost anywhere from $5,000 to $2,000,000 and up.

Transparent Access

"The only real solution to the problem is therefore the ability to provide transparent access to computers. Transparent access refers to the ability of the handicapped individual to access the computer in such a way that the computer program cannot tell in any way that the input is not coming to it in the standard fashion. For example, if a program is written to accept input from the keyboard, the modification must be made in such a way that it is impossible for the program to tell that the input is not coming from the keyboard.

"One technique that can be used is a keyboard emulator. The keyboard emulator is a small module which is installed inside a computer between its normal keyboard and the rest of the computer. Once installed, it does not affect the operation of the computer in any way. The keyboard operates in exactly the same fashion as it did before. The emulator, however, provides a small port or plug point where individuals using specialized communication aids can connect. They can then use their specialized communication systems (which they may operate using eye movements, head movements, or sip-and-puff, etc.) to generate their 'keystrokes' which are then fed to the keyboard emulator. The keyboard emulator in turn feeds them into the computer in such a way that it looks as if they were actually typed on the computer's keyboard. With a keyboard emulator installed in a computer, a wide range of individuals having very different communication aids and input techniques would be able to use the computer and all of its software without requiring any modifications of any kind to any software.

"In a classroom, for example, there might be fifteen computers lined up along one wall on which the students carry out their written assignments, etc. Two of the computers might have keyboard emulators installed in them, and a small 'access' sticker similar to that found on restrooms placed on the computers' cases. Any individuals who are unable to use the standard input keyboard could then use these two computers and control them using their specialized communication or writing systems. When not being used by handicapped individuals, these two computers could be used by anyone else. The situation would in fact look very much like a bathroom, where one or two stalls have been modified for use by handicapped individuals. The difference here would be that the non-handicapped individual would not able be to distinguish in any way (except, perhaps, by seeing the access sticker) that any type of modifications had been made to the system.

"For visually impaired individuals who cannot use the CRT display, substitute displays using tactile and voice output are under discussion and development. One proposed system uses a pad about the size of a pad of paper, which the blind individual touches. Wherever he touches the pad, the contents of the CRT screen corresponding to that portion of the pad are read vocally to him. This system can therefore be used by individuals who are blinded later in life as well as those who are congenitally blind, since it does not require any learning of special skills, such as Braille, etc.

"The problem, however, is not solved yet. While we are now coming up with solid solution strategies to deal with transparent access to keyboards, the computer designers are busy inventing non-keyboard methods for input to computers. Most of these input methods take increased advantage of the many physical abilities of the non-handicapped individual, as a result, they are even more difficult for handicapped individuals to operate than the keyboard. These input techniques include 'mice', voice inputs, and body tracking techniques. In addition, more complex video displays are being used, with heavy use of graphics and visual-spatial representation, which will make the task of providing alternate displays for visually impaired individuals even more difficult. The development of new strategies to deal with these problems, as well as the raising of the awareness level of computer designers to these problems, is therefore very important, and needs to be one of our highest priorities.

"So, where do the curb cuts come in? Let's imagine for a moment a town where there are only roads, and no sidewalks of any kind. Individuals in wheelchairs are not allowed on the road, and are therefore trundling their chairs across the grass. This of course is a very difficult activity, so they greet with great anticipation and joy discussions about putting little concrete runways along the side of all the roads, on which people can walk. Although it's clear that these walkways aren't being put in for the specific benefit of handicapped individuals, it also appears that it will be a tremendous boon to them. In all the celebration, though, people don't notice that along with the sidewalks come curbs. Thus, when the whole system is installed, the handicapped individuals find that they are now able to move very swiftly around on their own block, but for the most part are unable to access these nice pathways that have been laid throughout the society. Moreover, putting in the paths increased everybody else's ability to get around, thus making the difference between their mobility that much greater. They could put ramps on the sidewalks near their homes, or in the places that they go to a lot, but they really need to be able to access all of the little pathways if they are to be able to get around and about.

"Today, we find ourselves in exactly the same situation with regard to the area of computers and information systems. Very rapidly, our society is moving toward electronic assisted everything. In the process, electronic pathways are being laid throughout our society -- pathways which could tremendously increase the functional mobility and capabilities of individuals with physical and sensory disabilities. All of these electronic information pathways will be of little use, however, if unrestricted access is not available. Patching one or two access points is not sufficient, in the same manner that providing curb ramps or curb cuts for some of the sidewalks is

not sufficient.

"My message to you today is, let's not wait until all of the sidewalks have been laid and the curbs poured before we begin talking about curb cuts. It's incredibly expensive to go back and tear everything up to install the curb cuts later. Let's identify the problem and move now so that we can pour the curb cuts and provide unrestricted transparent access while we are laying these electronic pathways.

"It is certainly a bright, shiny and dynamic field. The potentials are enormous. But as it races ahead -- and continues to evolve -- it will be a continuing challenge to make sure that we maintain open channels of access -- unlimited unhandicapped access -- to these systems and all of their software. This applies not just to computers, but to the information systems they are going to generate. As we go through our society developing and creating these wonderful computer systems and information highways, let's make sure we don't forget to build the means to access them at the same time."

Gregg C. Vanderheiden, Trace R&D Center on Communication, Control, and Computer Access for Handicapped Individuals, University of Wisconsin-Madison.

Excerpted from a Keynote Speech at the Indiana Governor's Conference on the Handicapped, October 13, 1983.

COMPUTER-RELATED INFORMATION FROM THE TRACE CENTER

The Trace Center has a 10-page listing of publications related to communication and computer access. These publications, available from the Trace Center, are:

Access Problems with Computer-Based Services. E.J. Desautels. October 1983. Published by the University of Wisconsin, Department of Computer Sciences, Technical Report #516. 16 pages. Automated library services which students interrogate through computer terminals are becoming commonplace. This report examines the situation at the University of Wisconsin-Madison campus, and analyzes the general computer access problem in libraries as it impacts upon severely handicapped students.

Blissapple Description. $.15 (one copy free). This is a brief descriptive overview of the Blissapple program, including a listing of the hardware necessary to implement the program, the capabilities of the program, and some applications.

Blissapple Program. $35.00 (Manual only -- $20.00). This program allows a standard Apple microcomputer to function as a Blissymbol writing device. The program is on a 5" floppy disk. The price includes the program, a special "fix" disk to allow the program to be double-booted, and a 200-page manual.

Comparison of Apple, Epson, IBM,... Microcomputers for Applications in Rehabilitation Systems for Persons with Physical Handicaps, Revision D, 1984. G.C. Vanderheiden. This report provides a framework and discussion for comparing microcomputers as they relate to applications in rehabilitation. The report is structured in such a way that it can comparatively evaluate the systems in terms of costs and functions, and is formatted so that it can be used to profile and compare other computer systems. Information on the IBM PC, Apple IIe, TRS-80 Model 3 and 100, Epson HX 20, Sharp 1500/Radio Shack PC2, and HP75 are provided as examples.

Considerations and Approaches to Modifying and Designing Terminals to Allow Access by Handicapped Individuals to Data Processing Information Retrieval Systems. G.C. Vanderheiden. 1981. $2.00. This paper discusses some of the potentials and problems involved in making computer terminals and data processing systems available to handicapped individuals.

International Software/Hardware Registry. G.C. Vanderheiden and L. Walstead. $15.00. Program and adaptations for microcomputers to facilitate their use by handicapped individuals. Section 1 of the registry and listing provides a one-page description and a cross-reference listing of programs which have been written or adapted for use by individuals with handicaps. Each one-page entry includes a description of the program, the computer used, memory required, language used, accessories required, and current status and availability. Section 2 contains selected software that is not written for use by handicapped individuals, but which is particularly useful in offsetting their special needs. Section 3 provides a one-page categorical listing of special hardware modules and adaptors to facilitate use of microcomputers by handicapped individuals. Section 4 provides additional notes on adaptations and tips on the use of microcomputers by handicapped individuals. However, if you are looking for information on controls, switches, mounting, accessible accessories, etc., you won't find them in the Registry; please refer to the Non-Vocal Communication Resource Book from the Trace Center, the Rehab Sourcebook, or the Guide to Controls from Children's Hospital at Stanford, and to the sections on **CONTROLS**, **COMMUNICATION**, and **ENVIRONMENTAL CONTROL** for references on these topics.

Practical Application of Microcomputers to Aid the Handicapped. G.C. Vanderheiden. January 1981. $1.00. Microcomputers are providing rehabilitation engineers with powerful tools for designing cost-effective assistive devices. Potentials, approaches, and current shortcomings are discussed.

These publications are available from: Reprint Service, Trace Center, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53705. Prepaid, U.S. dollars only; payable to "University of Wisconsin--Madison."

USING A COMPUTER WHEN YOU CANNOT USE ITS STANDARD KEYBOARD

The Trace Center provided the answer to the following question. If you are still a little naive about computers and don't understand all the jargon, please refer to the glossary in any of the mass market "intro to computer" books.

How can I use a computer if I can't use its standard keyboard?

At the present time, there are four basic approaches for using a microcomputer or large computer, even if you have difficulty with the standard keyboard.

1) Custom Software

There are a number of custom software programs which have been written or adapted for use by handicapped individuals. Some of these programs require as little as one switch to operate. These programs generally run on the standard computer with little or no modification. They allow the handicapped individual to use the computer for these programs, but, since the computer can only run one program at a time, it is not possible to use these programs to control other standard computer programs.

Some of the new operating systems, however, are allowing options which allow you to specify you want the "keyboard" input to come from in such a way that it does not affect the operation of the rest of the computer or the use of the computers screen for the display. If a serial input port is specified as the "keyboard" in this fashion, it provides the equivalent of a "keyboard emulator", as described below. This emulator, however, will only work with software designed to run on these operating systems.

2) Modification to the System Software

This approach involves changing the firmware (fixed software) which other programs use to read the keyboard, etc. One could modify the BIOS in a CP/M system, for example. Any software used in the CP/M system thereafter could end up getting its input from a special interface whenever it asked for the input from the keyboard. This approach would theoretically allow the handicapped individual to use any standard software written for the microcomputer and operating system. Unfortunately, there are many pieces of software which use tricks of various kinds to increase their speed or flexibility. These tricks often rely on an unmodified operating system or circumvent the operating system (or monitor routines). As a result, these software system modifications provide only a partial solution, and work with only an unpredictable subset of the software for any given microcomputer. At the present time, no good patches or modified software systems have been identified. As they are identified, they will be listed in the Software/Hardware Registry.

3) Keyboard Emulators

About the only way to guarantee that a handicapped individual will be able to use standard software is if it is impossible through any software means to tell the difference between the handicapped individual using the keyboard and using his special interface. To accomplish this, a **keyboard emulator** could be used. This emulator would plug into the computer between the keyboard and the computer, and would look electrically identical to the keyboard. The handicapped individual would use whatever communication aid or interface was most appropriate. The output of the aid would be fed into the keyboard emulator, which would then feed it into the computer as if it had been typed on the keyboard. By using a keyboard emulator, therefore, an individual on a scanning aid, for example, would be able to use any standard software written to be operated by the keyboard of that computer. (Programs which used game paddles or push buttons would require game paddle or push button emulator capability as well.) Because the individual would be able to do anything from his "keyboard" that anyone else could do from the normal keyboard, he/she would be able to write programs for the computer as well as run existing programs.

Use of a keyboard emulator does not affect the normal uses of the computer in any way. The normal computer keyboard remains active and functional at all times, whether the keyboard emulator is being used or not. Thus, installation of a keyboard emulator in a computer allows access to the computer by handicapped individuals using special aids, but does not in any way degrade the function of the computer for non-handicapped users.

Commercially Available Keyboard Emulators

Several keyboard emulators are currently available. **Prentke Romich Company** (PRC) makes one which is designed to work with their Express communication aids. This keyboard emulator uses a two-wire serial ASCII input on a 1/4" phone jack. Although designed to work with the Express aids, this emulator can also be used by other serial output communication aids. No "busy" line is provided; the sending aid must therefore be careful to not send characters faster than the computer is expecting them, or they will be lost. This emulator has a switch which allows it to be used with aids having standard RS-232 output as well as with the Express aids. PRC currently has keyboard emulators available for the Apple II, Apple IIe, Atari, and IBM.

ZYGO also has an Apple keyboard emulator. It can also be used on the Franklin Ace. This emulator works only with the ZYGO communication aids, and has a special connector which interfaces directly to the connector on the side of the ZYGO aids. Since the ZYGO is not normally able to put out full words, the keyboard emulator has been designed to handle or provide some full-word commands in addition to single characters (e.g., "CATALOG", "RUN", etc.). ZYGO also has the **TETRA-SCAN** aid, which is a special scanning computer interface which includes its own keyboard emulator. Other related products are also in the works.

The Trace Center is currently working on a series of keyboard emulators. These emulators are being designed to allow access to a broad range of commonly used computers and terminals. Wherever possible, these modules will support a "busy" line to allow communication aids to send out complex command strings to computers. These emulators will then meter the commands to the computer as it is ready to receive each successive command or keystroke.

The interface card by **Paul Schwejda** (see below) also has a keyboard emulating capability in addition to its other input modes.

Johns Hopkins University has also developed a Morse code interface which has a built-in keyboard emulator. This unit is now being marketed by Medical Equipment Distributors in Chicago. It is designed to be used with the Apple II Plus computer.

For further information on these and other keyboard emulators, see the International Software/Hardware Registry.

4) Parasitic, Transparent Systems with Integral Keyboard Emulators

The previous section described the use of keyboard emulators with independent communication aids. They could also be independent interface systems which are physically built into the same box as the computer, but which have their own intelligence, display, etc. This is the most straightforward and fool-proof method to provide the handicapped individual with a means for controlling the computer in a way that will still allow the use of standard, unmodified software.

There are ways of accomplishing the same basic objective, however, without using fully independent systems. These techniques, however, in order to carry out their task of being compatible with all software, must exist within the computer without a) taking up any memory space, without b) altering the state of any portion of the computer, and without c) using up any CPU time. Since it is impossible to do all three of these things, none of the techniques in this category will work with all software. The amount of software with which they will work is purely dependent upon how cleverly they are implemented. In general, they are not as good a solution as using a keyboard emulator and having the second computer or a communication aid do the actual interfacing with the handicapped individual. Techniques in this category can, however, be less expensive than having a second independent computer/aid.

Two different efforts in this area should serve as examples. One effort is the Adaptive Firmware Card by Paul Schwejda, in Seattle, Washington. The second is a project under development at the Trace Center.

Paul Schwejda's Adaptive Firmware Card is designed to be used with the Apple microcomputer. It provides several different input modalities, including 1) assisted keyboard (for one-finger or mouthstick operation); 2) various types of scanning (for single-switch input); and 3) morse code (for multi-switch encoding). The card plugs into slot 7 in the microcomputer, where it is the first to be scanned at start-up. The card has a keyboard emulator built into it which allows it to control standard software. The card also has an interface box which mounts to the side of the Apple and allows users to connect special keyboards, switches, etc., to the firmware card, and use them for input.

The firmware card has all of its programs stored in ROM on the card itself. Thus, it uses no space in the computer for its programs. In addition, it has sufficient RAM on-board to be able to run its programs completely independently from the Apple system RAM. Because the card is almost completely transparent (i.e., cannot be "seen" by the computer), and does not use or alter the main memory, the card can be used with most software without modification to the software.

It does use some CPU time, however, and could throw off programs with critical timing loops. (One interesting use of the ability to interrupt the CPU would be to slow the program down by simply stealing a significant portion of the CPU time. Through this mechanism, the firmware card allows users to slow programs down from their ordinary speed, which is occasionally faster than the handicapped individual would desire.

PLEASE NOTE that there are two different versions of the Paul Schwejda Adaptive Firmware Card, one for the Apple II Plus and one for the Apple IIe.

Software Approach

The second example involves a purely software approach to the problem, although a software-hardware implementation could evolve. This work involves the modification of the operating system to implement other input routines besides the keyboard. This pure software approach is possible due to the design and structure of the operating system. Unfortunately, many programs currently go around the operating system in the computers. Thus, the modifications we make for computer access would be ignored, and many programs would not be accessible. Also, frequent updates to the operating systems by the computer companies could make "patches" obsolete. Work is continuing in this area in coordination with the software/computer companies themselves to see if solutions can be developed.

Summary

There are several ways to interface Apples and other computers to handicapped individuals. Some of these involve modification of the actual software. Others involve modification of the hardware. The best approaches are the one which allow the computer systems to use standard software. These approaches open up a much wider spectrum of materials and opportunity to the handicapped individual. They also allow the individual to actually program the computer himself.

The best overall approach to the problem is the use of a well-designed keyboard emulator. Such an emulator would in fact be transparent (invisible to the computer), and would allow the use of all

standard software and hardware accessories which are developed for the given computer. The keyboard emulator can be fed from another communication aid or from another microcomputer. For example, a small (inexpensive) microcomputer with a custom program written specifically for that individual (or that individual's type of handicap) could be used with a keyboard emulator in order to allow the individual to access any standard software on a second microcomputer. To do this, the two computers would not necessarily have to be the same make or model of computer, nor even from the same manufacturer. One computer could therefore be chosen to provide the characteristics and capabilities to best match the user's interface needs and abilities at an optimum price. The second computer would be chosen to have the capabilities and characteristics necessary to run the types of programs or utilize the types of standard software that the individual is most interested in using.

For more information on this topic area, see "Computers Can Play A Dual Role," available from the Trace Center Reprint Service or from the September 1982 issue of BYTE Magazine.

The best way to keep up with the latest developments in this area would be to check the Hardware section of the **International Software/Hardware Registry**. This Registry lists special interface programs and hardware modules as they become available.

Addresses of organizations cited in this article:

Medical Equipment Distributors
1701 South 1st Avenue
Maywood, IL
312/681-2828

Prentke Romich Company
8769 Township Road 513
Shreve, OH 44676
216/567-2906

Paul Schwejda
Adaptive Peripherals
4529 Bagley Avenue North
Seattle, WA 98103

Trace R&D Center
1500 Highland Avenue
314 Waisman Center
Madison, WI 53705

ZYGO Industries
P.O. Box 1008
Portland, OR 97207
503/297-1724

According to the editor of "Network News,"

"The more often a company is asked how to modify their brand of microcomputer for specific populations and uses, the more likely that company will be to incorporate transparent access into the design of their machines. Additional effort on the part of physically disabled individuals and those professionals working with them may be required to keep the interests of physically disabled individuals and other disabled persons in the awareness of microcomputer manufacturers and software producers. Computer manufacturers can be contacted by writing:

"APPLE COMPUTER INC., Education Division, 20525 Mariani Drive, Cupertino CA 95014, (408)996-1010.

"ATARI, INC., Home Computer Division, P.O. Box 61657, Sunnyvale, CA 94086, (800)538-8547.

"IBM/IBM-PC/IBM-PC.JR., Educational Marketing, P.O. Box 1328, Boca Raton, FL 33432, (404)238-2208.

"COMMODORE BUSINESS MACHINES, INC., 1200 Wilson Drive, West Chester, PA 19380, (215)431-9100.

"RADIO SHACK, P.O. Box 2625, Fort Worth, TX 76113, (817)390-3700."

"Network News" is a newsletter published by the Technical Assistance and Dissemination Network: Illinois Special Needs Population, Turner Hall 205, Illinois State University, Normal, Illinois 61761, Volume 6, #3, Special Edition 1984.

SOURCES FOR MORE INFORMATION ON MICROCOMPUTER APPLICATIONS FOR DISABLED PEOPLE

Just because an information source has "computer" and "a word related to disability" in the title does not mean that it will meet your needs.

Computer applications for the disability field seem to fall into 12 major areas. These are best represented in a generic model (below) of computer applications for handicapped persons from Computer Applications for the Handicapped in Special Education and Rehabilitation: A Resource Guide.

It has become increasingly important to understand the potential of computers in our lives. But before investing your time and money in books or courses on Computers and the Disabled, make sure you are going to gain the type of knowledge you are seeking; e.g., if you are looking for special hardware and software useful in the classroom for a child with a high spinal cord injury, you are unlikely to find it in a book that gives wonderful references to computer assisted instruction (CAI) materials for learning disabled kids. In your enthusiasm to plug into the world of high tech, be advised to be more selective than this writer was -- or you, too, will have a shelf of useful books that are mostly useless to you. (Editor)

The publications listed below could help guide you through this wealth of information, and help point to the knowledge you seek.

An Annotated Bibliography on Computers and the Physically Handicapped, 1981-1983. Available from ACM Special Interest Group on Computers and the Physically Handicapped, Association for Computing Machinery, 11 West 42nd Street, New York, NY 10036.

A Beginner's Guide to Personal Computers for the Blind and Visually Impaired. National Braille Press, 88 St. Stephen Street, Boston, MA 02115. 100 pages. $12.00. This book is written for people who don't know anything about computers. It offers guidelines for buying software, definitions of computer terminology and jargon, a review of six talking microcomputers and a chapter listing information on manufacturers, computer clubs and other useful resources for personal computer shoppers.

Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide. Nave, G., Browning, P., & Carter, J. Eugene, Oregon: University of Oregon, International Council for Computers in Education, 135 Education, 97403, January, 1983. 190 pages, $7.00 prepaid. This manuscript provides a means for interested persons to become informed about the newly emerging computer technology and its potential for improving the lives of physically and developmentally disabled individuals. It is a comprehensive bibliography comprised of 191 annotated references on computers for handicapped persons. The references, over half of which have been published since 1980, were drawn from more than 60 different periodicals, books, monographs, reports, and conference proceedings. A detailed descriptive narrative is provided for each reference. As reflected in the subject index, the materials cover a wide range of topical areas, e.g., Computer Assisted Instruction, Functional Aids, Microcomputer Application, Service Delivery, Management, and Research. These and other major content headings are further subdivided. For example, subsumed under the Disability/Handicap heading are the subcategories of autism, cerebral palsy, deaf, developmentally disabled, emotionally handicapped, learning disabled, minimally brain damaged, mentally retarded, nonvocal, physical/general, quadriplegic, and severely disabled.

Consumer Reports has an excellent series of articles on computer selection for the general public. They are usually available at your local library. (The Library of Congress publishes Consumer Reports on sound sheets.)

Microcomputer Resource Book for Special Education. Dolores Hagen. 1984. 224 pp. $15.95. Almost one third of the book is devoted to a series of appendices which provide information about more than two hundred publishers of software products. Products are groups by disability area and detailed information is provided about each program's use. Management programs, information on hardware including adaptive devices, and resources on LOGO are also included. Highly readable for parents and teachers.

A Generic Model of Computer Applications for Handicapped Persons

	Education			Rehabilitation		
	Instruction		Management		Functional Aids	
	Student/ Client	Teacher/Service Provider			Communication	Independent Living
Physical Disability						
Developmental Disability						

from "Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide"

Microcomputers in Special Education: Selection and Decision Making Process. Florence M. Taber. 1983. 112 pp. $7.95. Provides the kind of information and guidance school administrators and other decision makers need before committing themselves to a given microcomputer system. Considerations related to software evaluation, hardware, and inservice education are covered, including rating forms and questionnaires.

Personal Computers and the Disabled, A Resource Guide. Apple Computer, Inc., has prepared this document as a public service to stimulate research into personal computer applications for the disabled. "This guide brings together a range of ideas and information to help people use personal computers in applications designed especially for the disabled. In it you'll find feature articles on how the computer is helping the disabled to overcome obstacles that once limited career opportunities and job performance. You'll also find articles on how the computer is helping individuals communicate even when motor and speech functions are severely impaired. Some are using personal computers to tap their creativity in art, writing, and computer programming.

"If you are a software developer, original equipment manufacturer, or computer dealer, this guide will introduce you to specific personal computer products and applications for the disabled. If you're already working on applications for the handicapped, this guide provides a way for you to let others know what you are doing."

This booklet has an excellent resource directory listing people and organizations active in the area of personal computers for the disabled. A free copy of the Resource Guide is available from your local Apple computer dealer, or contact Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014.

Personal Computers and Special Needs. Dr. Frank Bowe. In bookstores and computer stores, or available from Sybex Computer Books, 2344 Sixth Street, Berkeley, CA 94710, 800/277-2346. $9.95. June 1984.

Personal Computers Serving People: A Guide to Human Service Applications, by Robert Lavine. Hawkins and Associates, Inc., Washington, DC, 1980. Includes an overview of hardware and software and chapters dealing with personal computers in rehabilitation, education, creative art, and recreation and leisure; selection of a personal computer; recommended readings, other information sources, and a directory of manufacturers.

Signs for Computing Technology. National Association of the Deaf Book Store, 814 Thayer Avenue, Silver Spring, MD 20910. $10.95 plus $1.50 for postage and handling. This book lists signs for more than 600 computing terms. The book will assist deaf people working in the computer industry, as well as managers and co-workers who want to facilitate technical communication with their deaf peers. The book will also be helpful for data processing instructors teaching deaf students.

Also see the **Trace Center Publications** which have already appeared in this section.

CLEARINGHOUSES AND CATALOGS

The Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091, 703/620-3660.

A Directory of Microcomputer Software for the Disabled, Timothy Field, Editor. Elliot & Fitzpatrick, Inc., P.O. Box 1054, Athens, GA 30603. 1983.

HHDB Online Courseware Directory. Handi-House CAI, 69 Winchester Avenue, Spruce Grove, Alberta T0E 2C0, Canada. 403/962-3933. Handi-House CAI is a division of DSS Decision Support Systems Limited, and was formed in 1982 as a computer software clearing house for individuals experiencing handicaps. The clearinghouse responds to a need for centralized information, consulting, evaluation, and registration of suppliers of computer-aided instruction programs matched to users.

Handi-House offers an inquiry answering service by which clients are provided with a list of software and suppliers matched to individual needs and equipment. Information requests are maintained for one year, during which new updates will be sent to clients as additional software becomes available. Additionally, its software customizing service includes the provisioning and modification of software on a time and materials cost basis.

Data sources include other clearing houses, authors, personal computer suppliers, libraries, data bases, government agencies, research centers and educators.

The Handicapped's Source, A division of Computability Corp. J.A. Reston Corporation, 60 Page Road, Clifton, NJ 07012, 800/631-7277, 201/777-2700. This catalog offers descriptions of personal computers, hardware, software, peripherals, and the services available to the disabled individual and those who assist them through rehabilitation and care services.

The MECC Educational Computing Catalog. Minnesota Educational Computing Consortium, 3490 Lexington Avenue North, St. Paul, MN 55112. 612/638-0627. Contains a complete listing of courseware developed by MECC for the Apple II personal computer and the Atari home computer. Containing a wide range of sections, it includes one on special education which describes several programs particularly suited to handicapped students.

Trace Center International Software/Hardware Registry, Gregg Vanderheiden & Lottie Walstead, eds. Trace R&D Center, University of Wisconsin-Madison, 1500 Highland Avenue, Madison, WI 53705. 608/262-6966. $15.00 plus $2.78 postage & handling. 1983. Updated second edition, July 1984.

253

NEWSLETTERS

BAUD is the newsletter of the Blind Apple Users Group. It is available from Joe Giovanelli, 1158 Stewart Avenue, Bethpage, NY 11714; phone 516/433-0171.

The Bulletin of Science and Technology for the Handicapped, American Association for the Advancement of Science, 1776 Massachusetts Ave., Washington, DC 20036. No charge.

The Catalyst. Western Center for Microcomputers in Special Education, 1259 El Camino Real, Suite 275, Menlo Park, CA 94025, 415/326-6997. Subscriptions: Organizations $20.00, Individuals $12.00.

Communication Outlook is an international publication which provides a forum for individuals interested in the application of techniques and aids for people who experience communication handicaps due to neurological or neuromuscular conditions. It is a cross-disciplinary information source and regularly has articles related to microcomputer applications. Subscriptions cost $12 ($15 outside North America), are available from Artificial Language Laboratory, Michigan State University, East Lansing, MI 48824.

Closing the Gap is a bimonthly newsletter aimed specifically at the use of computers for handicapped persons. The newsletter covers hardware, software reviews and articles on computers as they affect handicapped people in education, independent living and employment. Subscriptions are $15.00 per year in the U.S., $22.00 per year in Canada and Mexico, and $33.00 per year in all other countries. Write to Closing the Gap, Route 2, Box 39, Henderson MN 56044. Phone (612)665-6573.

Link and Go is published by the Committee on Personal Computers and the Handicapped (COPH-2), a part of the Illinois Congress of Organizations of the Physically Handicapped (COPH). Its purpose is to search out, evaluate, and share information about personal computer systems as relevant to the person with disabilities in its membership. A major stance of its founders is that COPH-2 is a mainstreaming effort which will enable persons with disabilities to use the same computer technologies with the same attitudes as the public-at-large. The newsletter is an excellent information resource. Quarterly; $8.00, which includes membership dues. Available from COPH-2, 2030 West Irving Park Road, Chicago IL 60618.

Raised Dot Computing Newsletter: This monthly newsletter focuses on personal computer applications for the blind. It includes information on the use of low-cost Braille devices, voice synthesizers, paperless Braille, and the use of microcomputers in Braille translation. In addition, the newsletter supplies technical notes and information on the use of software and hardware products that extend the performance of Braille-Edit, a product of Raised Dot Computing. Print or audio subscriptions are available from Raised Dot Computing, attn. David Holladay, 310 S. 7th Street, Lewisburg, PA 17837. 717/523-6739.

Re:Able is a bi-monthly newsletter on computer-assisted living published for the professional community and the disabled. Re:Able explores the newest in computer equipment and new technology. Each issue details advances in equipment and applications, with emphasis on the usefulness to the disabled. Evaluations of hardware and software, products, books, and resources provide the professional with information vital to serving the disabled. Subscriptions are $18 per year ($21 overseas). Send to: Re:Able, P.O. Box 384, Bellflower, California 90706.

Sensory Aids Technology Update is a monthly newsletter on technology and employment issues concerning disabled people. This new publication is a rich source of information on technology applications. It is particularly valuable to people looking for information on sensory aids (hearing and vision), but is also useful for other types of technology. It has features on new products, special employment, education and training programs, unusual applications of technology, and new developments in research. New publications and interesting audiovisual programs are regularly reviewed, and each month the product comparison section profiles similar devices. It includes news from overseas. The articles are concise, and include references to guide you to further information. A typical issue includes: Accessing dedicated word processors; Financing adaptive aids; Project Partnership; Equipment demo centers for hearing impaired; Apple software customized for speech output (December, 1983). A one-year subscription to Update is $30.00; available from Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306.

SIGCAPH Newsletter. A quarterly publication of the ACM Special Interest Group on Computers and the Physically Handicapped; print and tape cassette versions. Association for Computing Machinery, 11 West 42nd Street, New York, NY 10036.

MASS MARKET COMPUTER MAGAZINES

BYTE, Volume 7, No. 9, September, 1982. BYTE Publications, Inc., P.O. Box 328, Hancock, NH 03449. $3.70. The theme in the September 1982 issue is "Computers and the Disabled". Gregg Vanderheiden discusses how "Computers Can Play a Dual Role for the Disabled," and with co-author Paul Schwejda demonstrates how to make an "Adaptive Firmware Card for the Apple II"; David Stoffel reviews talking terminals for the blind and William L. Rush evaluates the Abilityphone, a device for nonvocal communication; Patrick Demasco and Richard Foulds show how the Panasonic Hand-Held Computer can be used as a communication device in "A New Horizon for Nonvocal Communication Devices"; Steve Ciarcia brings you his latest speech-synthesis system in "Build the Microvox Text-to-Speech Synthesizer: Part 1 -- The Hardware"; Dr. William Murray reviews The Cognivox VI-1003, a speech-recognition system; Bruce Baker discusses his highly original Minspeak associative memory system for portable speech synthesis; and Alfred Fant, Jr. shows you how to use a line printer to produce Braille. In case you're thinking of marketing your own computerized aid, see BYTE's overview of the FDA's regulations con-

cerning medical devices.

Computer, Volume 14, No. 1, January, 1981. IEEE Computer Society, 10662 Los Vaqueros Circle, Los Alamitos, CA 90720, 714/821-8380. This issue carried the overall title "Computing and the Handicapped." Articles included: "Computing and the Handicapped: Guest Editor's Introduction," Paul Hazan; "Computing and the Handicapped: A Promising Alliance," Margaret J. Giannini; "Computing and the Handicapped: The Challenge in Education," Henry J. Blaszczyk; "Intelligent Prosthetic Devices," M.A. Rahimi; "Communication Devices for the Nonvocal Disabled," Andrew Thomas; "A Computer-Aided Robotic Arm/Worktable System for the High-Level Quadriplegic," Wolfger Schneider, Gerhard Schmeisser, and Woodrow Seamone; "Rehabilitation and the Handicapped Programmer," Robert J. Leneway and Billy R. Montgomery; and "Practical Application of Microcomputers to Aid the Handicapped," Gregg C. Vanderheiden.

CONFERENCE PROCEEDINGS

Computers for the Disabled: Conference Papers. Edited by Janet E. Roehl, Ph.D. Available from: Materials Development Center, Stout Vocational Rehabilitation Institute, School of Education and Human Services, University Wisconsin-Stout, Menomonie, Wisconsin 54751. 1984

"This conference provided teachers, administrators, counselors, government personnel, researchers, purveyors of computer technology, and persons with disabilities an excellent opportunity to learn about the advances made in computer technology that are impacting special education and vocational rehabilitation today.

"The conference was held September 12-14, 1983 in Minneapolis, Minnesota. There were over 500 participants, 60 presentations, 40 exhibitors, and three keynote addresses.

"The Conference Papers offer an abundance of new ideas, research findings, and innovations that were presented at Discovery '83. Part I includes the three keynote addresses. They were given by Dr. Douglas A. Fenderson, Director, National Institute of Handicapped Research, United States Department of Education; Dr. Gregg Vanderheiden, Director, Trace Research and Development Center for the Severely Communicatively Handicapped, University of Wisconsin-Madison; and Mr. Thomas Shworles, Chairperson, Committee on Personal Computers and the Handicapped (COPH-2), Illinois Council of Organizations of Physically Handicapped. These addresses are printed in order of appearance.

"Part II is the papers presented during the three day conference. These include reports of research activity in computer usage, papers detailing the modification of hardware and software, as well as designing of new products. The general interest areas were: deaf and hearing impaired, blind and vision impaired, physically handicapped, learning disabled, and EMT-TMH."

Computers and the Handicapped Tutorial, Canadian Medical and Biological Engineering, Society Secretariat, 1142 Elmlea Drive, Glouster, Ontario Canada K1J 6V9. 613/993-0475. An overview of new programs, accessories and communication aids that work with the Apple II and other personal computers to help the physically disabled. The articles were presented in June, 1982, in Ontario, Canada, at a Tutorial sponsored by the Biomedical Engineering Research Program. A sampling of the 16 articles contained in the guide include "Interfaces for Physically Handicapped Persons" by J.R. Charbonneau; "The Handicapped Typewriter" by Simon Cox and Bill Smith; and "The Application of the Apple Microcomputer as an Augmentative Communication Aid for the Non-Vocal Physically Handicapped" by Penny Parnes and Kathy Lee.

Computers and the Handicapped Workshop, Canadian Medical and Biological Engineering, Society Secretariat, 1142 Elmlea Drive, Glouster, Ontario Canada K1J 6V9. 613/993-0475. This publication compiles the results of the Workshop on Computers and the Handicapped held in June, 1982, in Ontario, Canada. The purpose of the Workshop was to present new developments in the use of personal computers for the handicapped, and to address many of the problems and limitations in this field. A sampling of the 17 articles that appear in the guide includes "Choosing a Dedicated Communication Device vs. a Personal Computer: What Are the Differences and What Difference Does It Make?" by Shirley McNaughton; "Technical and Social Implications of Computer Use by the Handicapped Consumer" by Patricia and John Israel; and "Impact of Low-Cost Microcomputer Technology for the Blind" by Ian Lowrie.

Proceedings of The Johns Hopkins First National Search for Applications of Personal Computing to Aid the Handicapped, October 31, 1981, The Institute of Electrical and Electronics Engineers, Inc. (IEEE) Computer Society, New York, New York. 30 pages. 1981. Available from: IEEE Computer Society, P.O. Box 80452, Worldway Postal Center, Los Angeles, CA 90080. A national search for applications of personal computing to aid the handicapped was carried out by the Johns Hopkins University Applied Physics Laboratory. This one-year program was sponsored by grants from the National Science Foundation and Radio Shack, A Division of Tandy Corporation. Professionals, amateurs, and students were invited to present their ideas and concepts, leading to ten winners being selected by a panel of judges in each of ten Federal Regions of the United States, as well as ten prizes awarded on a national level. One important output from this contest was the increased awareness by technical computer personnel of the problems and needs of the handicapped.

The sources of the hardware and software resulting from this contest are difficult to locate. The Trace Center International Hardware/Software Registry now includes all hardware and software that was reported in this document and is known to be currently available.

The Institute of Electrical & Electronic Engineering (IEEE) Computing Society has committed itself to furthering the use of computer technology for aids for the handicapped by creating a **Technical Committee (TC)** on Computing and the

Handicapped, and by supporting such activities as the Johns Hopkins National Search. Workshops have been held annually, and proceedings are available.

Proceedings of the IEEE Computer Society Workshop on Computing to Aid the Handicapped, November 4-5, 1982, Charlottesville, Virginia. Available from: IEEE Computer Society, P.O. Box 80452, Worldway Postal Center, Los Angeles, CA 90080.

Proceedings of the IEEE Computer Society Workshop on Computers in the Education and Employment of the Handicapped, November 3-4, 1983, Minneapolis, Minnesota. Sponsored by the IEEE Computer Society TC on Computing and the Handicapped, ACM-SIGCAPH, and IEEE TC on Computers in Education, in cooperation with Control Data Corporation, Minneapolis, Minnesota. Purchase from Everett L. Johnson, Chairman, TC Electrical Engineering Department, Wichita State University, Wichita, Kansas 67208.

For information on the 1984 conference, which is scheduled for November 8-9, 1984, in Wichita, Kansas, contact Dr. Elmer Hoyer, Wichita State University, University Box 44, Wichita, Kansas 67208.

This conference will provide a forum for interaction between those involved in the use of computers in special education and those designing the hardware and courseware. Proceedings are also expected to be available from this meeting.

Proceedings of the National Conference on the Use of Microcomputers in Special Education, Hartford, Connecticut, March 1983. Michael M. Behrmann, Editor, Liz Lahm, Assistant Editor. 1984. Approx. 200 pp. $20.00. The Proceedings from CEC's First National Conference on the Use of Microcomputers in Special Education was undertaken to provide state of the art information on the application of microcomputer technology to special educators. Presentations are grouped thematically in five major sections. Section I is an overview and includes the two keynote presentations, the material from the special continuing education training, and other presentations of general interest. Section II, on Management, includes computer assisted management and computer managed instruction. Section III, the teacher training section, is directed specially toward teacher literacy in the use of microcomputers. Section IV includes material on training children in computer literacy and presents some instructional uses with exceptional children. Section V, Computers as Tools, presents papers that show how computers can be used as tools by handicapped individuals. Information about commercial resources gathered from conference exhibitors is also included.

ELECTRONIC INFORMATION EXCHANGE NETWORKS

A newsletter for those involved in electronic mail systems is Handi-Communications. Quarterly newsletter for Working Group 6.5 (Computer Message Systems) of IFIP (International Federation for Information Processing), Julian Davies, Editor. Published at the Department of Computer Science, University of Western Ontario, London, Ontario, Canada N6A 5B7. 519/679-3569 or 519/679-6016. Annual subscription $5.00 Canadian in Canada, $5.00 US elsewhere. Single issues $1.50. This newsletter is devoted to the topic of computer communication systems and their use by or for handicapped people. It is published for those concerned that the needs of the handicapped be met in the design and provision of computer message systems. The main focus for Handi-Communications is in Computer Based Message Systems (commonly known as "electronic mail"). They will cover other aspects of telecommunications for handicapped people that have a bearing on message systems, such as terminal design. A hard-copy distribution is the only medium available initially, but proposals to arrange distribution in other forms are welcome. In particular, the text can be made available in computer-readable form, and could be distributed electronically.

Large Networks

These large networks also provide a means of information exchange for disabled people:

Compuserve, 5000 Arlington Center Blvd., P.O. Box 20212, Columbus, OH 43220. 800/848-8199.

In addition to a wide range of general information, financial data, games, newspapers and a travel bureau, CompuServe offers a database especially designed for disabled computer users. This database includes addresses of organizations providing services to disabled people, information about adapted software, and articles describing various disabling conditions.

Source, Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102. 703/734-7500.

National Networks Devoted to Disability

CONFER: See **INFORMATION RESOURCES** section, p. 14.

Handicapped Education Exchange (HEX). See **INFORMATION RESOURCES** section, p. 14.

Special Net. National Association of State Directors of Special Education, 1201 16th Street NW, Suite 404E, Washington, DC 20036. 202/822-7933. See **INFORMATION RESOURCES** section, p. 14.

DEAFNET: See **SENSORY AIDS** section, p. 219.

Model Projects for Local Disability-Related Networks

CHIP Network, 222C View Street, Mountain View, CA 94041. 415/968-8798. The Community Health Information Project (CHIP) is developing a permanent microcomputer-based network called WellNet. This information exchange, based on Apple computers and Communitree electronic bulletin board software, will form the basis of a larger network that will link rehabilitation groups, health-service organizations, and disabled groups and individuals in the Santa Clara Valley and eventually the Bay Area. The network will include a transportation bulletin board (ride board), consumer evaluations of products and services, calendars, attendant referrals, international programs, health care aids, and services to buy, sell, or barter. WellNet currently involves four California-based organizations: CHIP in Mountain View, Physically Limited Services at DeAnza College in Cupertino, Center for Independence for the Disabled in Belmont, and United Cerebral Palsy in Palo Alto.

DEAFNET: See **SENSORY AIDS** section.

"Land of Ah's" Network, Topeka Independent Living Resource Center, 421 Southeast Winfield, Topeka, KS 66607. 913/233-6323. The "Land of Ah's" Network is currently under development by four agencies in the state of Kansas. This Apple-computer-based network will allow the disabled throughout the state of Kansas to share information, resources, and technical assistance on independent living. In addition, disabled volunteers will be trained to operate and maintain the information network, enabling them to become knowledgeable in areas of computer technology. It will also increase their potential for employment. Agencies developing the network include the Topeka Independent Living Resource Center; Independence Living Resource Center, in Lawrence; Operation LINK in Hays; and Kansas Rehabilitation Services in Topeka.

CONSUMER-RUN INFORMATION EXCHANGE NETWORKS

Blind Apple Users Group. Contact Joe Giovanelli, 1158 Stewart Ave, Bethpage, NY 11714, 516/433-0171.

Committee on Personal Computers and the Handicapped (COPH-2), 2030 West Irving Park Road, Chicago, IL 60618. 312/477-1813. COPH-2 is a consumer-based organization which provides members with technical assistance, personal computer loans, use of a resource library, and networking opportunities. The organization also designs and produces keyguards to prevent inadvertent striking of keys, publishes a quarterly newsletter, and conducts public education meetings.

Quadriplegics Communications Group, Inc., 407-333 Stradbrook, Winnipeg, Manitoba R3L 0J5, CANADA.

Children's Computer User Groups

Disabled Children's Computer Group, c/o Lawrence Hall of Science, University of California, Berkeley, CA 94720. The Disabled Children's Computer Group was formed in November, 1983 by a group of parents of disabled children. Among the members of the group are parents, teachers and professionals in the field of education, social services and computer technology. The DCCG provides a forum for the sharing of information and experiences about computer applications for disabled children (visually impaired, hearing impaired, physically disabled, learning disabled and developmentally disabled).

DCCG activities include general meetings where presenters demonstrate uses of hardware and software (held every other month at the Lawrence Hall of Science, UC-Berkeley), weekend workshops on specific topics, maintaining a collection of reference materials, housed in the LHS science and math library, and demonstrations and presentations at local community conferences and meetings. DCCG, working with the Lawrence Hall of Science, is seeking support to establish a "lending library" of computer hardware for disabled children, which would provide parents the chance to try out a system before investing in it; a demonstration center featuring computers for disabled children, serving as a focal point for hardware modification and software development, and for parent, teacher and student training, and a local computer network to share resources and needs, in part via an electronic bulletin board.

Kansas Handicapped Children's Computer Cooperative, HCC, 7938 Chestnut Street, Kansas City, MO 64132. Newsletter $4.00/year.

SPECIAL INTEREST GROUPS

Handicapped Special Interest Group (SIG), International Apple Core, P.O. Box 261, Lincoln, MA 01773. 617/666-1581. Handicapped SIG is one of 30 special interest groups under the organizational umbrella of the International Apple Core (IAC), a group of Apple computer users. The group currently functions as a clearinghouse of resources and information for Apple users, and potential users, who are handicapped.

Occupational Therapy Microcomputer Club. Marilyn Sidler, president. P.O. Box 158, La Mesa, CA 98041. Occupational therapists who now have or plan to acquire a microcomputer have formed a special interest group. A newsletter is available.

SIGCAPH: Special Interest Group on Computers and the Physically Handicapped, Association for Computing Machinery, 11 West 42nd Street, New York, NY 10036. Open to all computer professionals and others with serious interest, not just their disabled colleagues. SIGCAPH was founded in 1970 with the following aims: promoting the professional interests of computing personnel with physical disabilities; promoting the application of computing and information technology toward solutions of disability problems; promoting public education in support of computing careers for suitably-trained blind, deaf, and motor-impaired individuals. Publishes quarterly SIGCAPH Newsletter in cassette "talking" edition as well as print version.

RESOURCES FOR SPECIAL APPLICATIONS

INFORMATION ON COMPUTER APPLICATIONS IN SPECIAL EDUCATION

The Council for Exceptional Children (CEC) was founded in 1922 to serve those who serve the educational needs of exceptional children. It has 989 local chapters, 46 student associations, 58 federations and 12 special education divisions.

The following publications and resources on Microcomputers in Special Education are available from CEC, Department 5512, 1920 Association Drive, Reston, Virginia 22091-1584.

Microcomputer Resource Book for Special Education, Dolores Hagen. 1984. 224 pp. $15.95. This book provides an understanding of the microcomputer as a life competency tool. The full spectrum of software and adaptive devices are described. Material is supplied on learning disabled, hearing impaired, visually impaired, mentally retarded, and physically handicapped. Computer needs of each disability group are examined. The advantages and disadvantages of each type of program are weighed. Descriptions of real children's experiences with computers are included. Appendices provide information about more than two hundred publishers of software products. Products are grouped by disability area; detailed information is provided about each program's use. Management programs, information on hardware including adaptive devices, and resources on LOGO are included. Shows how computers can work for children at home and in the classroom.

Microcomputers in Special Education: Selection and Decision Making Process, Florence M. Taber. 1983. 112 pp. $7.95. Provides the kind of information and guidance school administrators and other decision makers need before committing themselves to a given microcomputer system. Considerations related to software evaluation, hardware, and in-service education are covered, including rating forms and questionnaires. Includes chapters on effective uses of the microcomputer for instructional and administrative purposes, elementary programming, and special education applications. Useful to the individual engaged in the selection and decision making process. Also appropriate as an inservice or supplementary text for regular and special educators.

Microcomputers in Special Education. Special issue of Exceptional Children, October, 1982.

Proceedings of the National Conference on the Use of Microcomputers in Special Education. Hartford, CT, March 1983. M.M. Berhmann, Editor; L. Lahm, Assistant Editor. 200 pp. $20.00. Description listed in **Conference Proceedings** section, p. 240.

Special Ware Directory. LINC Resources, Inc. 1983. 97 pp. $13.95. A resource on microcomputer software for special educators. It lists and describes commercially produced software which is useful in special education programs. Included in the directory are three categories of software: (1) software designed specifically for special education use; (2) software applicable to special education; and 3) software which may be modified for special education use.

Computer Search Reprints

Computer search reprints are bibliographies with abstracts from the ERIC and ECER databases. Topics that continue to be popular are updated twice a year. Computer search reprints are $10.00 each.

506: Computer Assisted Instruction for Handicapped Children and Youth (100 abstracts)
509: Use of Computers in Regular and Special Education Teacher Education (100 abstracts)
528: Computers and Gifted Students (50 abstracts)
532: Computer Managed Instruction for Handicapped Students (50 abstracts)

Technology and Media (TAM): A New CEC Division. TAM was recently organized to be an international association of special education professionals interested in technology and media, and its impact upon the diagnosis, treatment, and educational habilitation of exceptional persons. It works toward promoting a closer professional relationship among educators and others concerned with the uses of technology and media with exceptional children; encouraging development and dissemination of new applications, technologies, and media; initiating and working cooperatively with education agencies, government, and business and industry in research, demonstration, and validation efforts; and advancing standards for technology and media to be used with exceptional individuals. For more details on TAM, contact membership committee chairperson Dr. Charles MacArthur, P.O. Box 497, Vienna, Virginia 22180, 301/454-5427.

Project RETOOL. CEC Training Project on Microcomputer Applications in Special Education for Teacher Educators, Elizabeth McClellan, Ed.D., Coordinator, 1920 Association Drive, Reston, VA 22901, 703/620-3660. The RETOOL Center is in the process of forming a network of teacher educators who are interested in microcomputers. The purpose of the network is to provide a means of communication for microcomputer users who want to request information on a particular topic or to share information and resources. The network will be using the SpecialNet system of communication. Any TED members who are interested in technology and who have access to SpecialNet are encouraged to join. A bibliography, "Microcomputers in Special Education," is available from the RETOOL Center.

To get more information on CEC's initiatives in technology, write: Future CEC Training and Technical Assistance in Special Education Technology, CEC Department of Field Services, 703/620-3660.

Division of Physically Handicapped (DPH). CEC has one division supporting the interest/needs of educators of physically handicapped children. If you are member of CEC and not DPH, please consider joining this division.

The Catalyst. S. Sweezy, editor. Western Center for Microcomputers in Special Education. 1259 El Camino Real, Suite 275, Menlo Park, CA 94025. 415/326-6997.

"Computers: The future is here." Exceptional Parent, V. 13, June 1983, pages 7-43. Among the articles in this issue, which is almost exclusively on computers, are explanations of computer terms, discussions on properly matching the best suited systems with special needs of disabled children, descriptions of available devices, personal narratives about computer experiences, and resources for parents.

1984 Directory of Resources for Technology in Education. D. Lloyd-Kolkin et al. Available from Far West Laboratory for Educational Research and Development, 1855 Folsom Street, San Francisco, CA 94103. $12.95 softbound, $19.95 hardbound. 1984. The references are for regular education, not special education.

Special Technology for Special Children. E. Paul Goldenberg. University Park Press, Baltimore, MD. 1979.

"Technological Advances in Special Education." Exceptional Education Quarterly, Winter 1984. Available from: PRO-ED, 5341 Industrial Oaks Blvd., Austin, TX 78735.

"The Use of Microcomputers in the Cognitive Rehabilitation of Brain Injured Persons." Kurlychek, R.T., and Glang, A.E. Using Computers in Clinical Practice -- Psychotherapy and Mental Health Applications. M.D. Schwartz, Editor. Haworth Press, New York, 1984.

Model Training Projects for Blind Children

Twenty-two San Francisco Bay Area blind children, ages eight to eleven, will be taught by Sensory Aids Foundation (SAF) to use educational software on Apple computers. The new program, funded by a $50,000 grant from the U.S. Department of Education, hopes to demonstrate the practical and commercial feasibility of modifying off-the-shelf software for use by blind students. For more information, contact Susan Phillips, Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306. 415/329-0430.

U.C. Berkeley's Center for Multi-Sensory Learning recently received a grant from the U.S. Department of Education to evaluate the educational potential of microcomputers in teaching visually impaired students from junior high school through college. For more information, contact Linda DeLucchi, Center for Multi-Sensory Learning, Lawrence Hall of Science, U.C. Berkeley, Berkeley, CA 94720. 415/642-3679.

INFORMATION ON COMPUTER APPLICATIONS IN COGNITIVE REHABILITATION

Cognitive Rehabilitation
Odie L. Bracey, Editor

"This magazine is intended for those therapists doing the day-to-day therapy with brain injured patients. It publishes articles on special techniques used in therapy, observations on working in rehabilitation, information on how programs are set up and what seems to work and what does not. At least one complete and hopefully useful computer program will be listed in each issue. These programs will provide statistical routines, data analysis programs, record keeping programs and computerized data collection techniques. In addition, utility programs for drawing and designing screen displays, graphing and plotting will be provided. This publication provides support for sharing information about the Psychological Software Service (PSS) cognitive rehabilitation computer programs."

Published bi-monthly by B&B Publishing Co., P.O. Box 29344, Indianapolis, IN 46229. Subscription rate is $25 per volume.

Computer Treatment of Speech/Language/Cognition Disorders

This workshop presents a system for microcomputer-assisted treatment of patients with speech, language and cognitive impairments, and can accommodate up to 5 participants at a time. It is held at Beaumont Hospital, so participants can observe patients using clinical software programs as part of their treatment on Beaumont Hospital's Rehabilitation Unit, in the hospital's Outpatient Aphasia Program and during Cognitive Rehabilitation activities and interact with staff members using the microcomputer with brain-damaged patients at various levels of communicative impairment. For more information, contact Michael I. Rolnick, Ph.D., Director, Speech and Language Pathology, William Beaumont Hospital, 3601 W. 13 Mile Road, Royal Oak, MI 48072. 313/288-8085.

VOICE INPUT / VOICE OUTPUT / BLIND ACCESS

SOME SOURCES OF INFORMATION: VOICE INPUT

Maryland Computer Services, Inc.
(Various voice input hardware and software)
2010 Rock Spring Rd.
Forest Hill, MD 21050
(301) 879-3366

Motor Handicapped Support System ($399.00-$499.00)
(Voice recognition microcomputer access program)
ARTRA Inc.
P.O. Box 653
Arlington, VA 22216

Shadow/Vet $995.00
(Voice entry terminal)
Scott Instruments
1111 Willow Spring Drive
Denton, TX 76201
817/387-9514

Talk Typer
(Voice-operated word processor)
G.E. Rushakoff
Department of Speech, Box 3W
University of New Mexico
Las Cruces, NM 88003
(505) 646-2801

Vocalization Trainer ($50.00)
(Visual feedback program for hearing impaired)
Ken Macurik
SVTC Box 4110
Petersburg, VA 23803
(804) 861-7274

Voice Connection
formerly Voice Machine Communications, Inc.
17835 Skypark Circle #C
Irvine, CA 97214
714/261-2366

Voice Recognition Systems
(Voice Input Module for Apple II+, IIe, and IBM PC $995-1395)
550 Battery Road, Suite 1716
San Francisco, CA 94111
(415) 788-2007

SOME SOURCES OF INFORMATION: VOICE OUTPUT

BAYSIK Speech
(SAYIT program* for TRS-80 Model I or III - $125)
1259 El Camino Real, Suite 289
Menlo Park, CA 94025
(415) 854-1772

Art Gaylord
(Message Writer* program for Apple II+ - $75)
2208 Country Squire Dr.
Urbana, IL 61801
(217) 333-1728

Carl Geigner
(Say It* program for Apple II+ - $30)
Schneier Communication Unit, Cerebral Palsy Center
1603 Court Street
Syracuse, NY 13208

Dr. Michael Hillenger
(Syntax.1* program for Apple II)
R.F.D., Sharon, VT 05605
(802) 448-3838

Intelligent Software Systems
(SpeakEasy* program for Apple II+ - $500)
P.O. Box 621-
Amherst, MA 01002
(412) 549-0474

I.O.R. Enterprises
(Various voice output programs)
229 Harrison Avenue
Highland Park, NJ 08904
(201) 846-5200

Maryland Computer Services
(Talking computer terminal - $5995)
2010 Rock Spring Road
Forest Hill, MD 21050
(301) 879-3366

Raised Dot Computing
(Braille-Edit* program for visually impaired, Apple II+)
310 S. 7th St.
Lewisburg, PA 12837
(717) 523-6739

G. Evan Rushakoff
(Talk II* program for Apple II+ - $90)
Box 3W
Department of Speech
University of New Mexico
Las Cruces, NM 88003
(505) 646-2801

James S. Schaefer
(Basic Interpreter for the Blind* program for TRS-80 Model II - $15)
33 Jackson Rd.
Berlin, NJ 08009
(609) 767-2751

Street Electronics
(speech synthesizers & related software)
1140 Mark Avenue
Carpinteria, CA 93103
(805) 684-4593

Trace R&D Center
(Talking BlissApple Program* for Apple II - $35)
314 Waisman Center, 1500 Highland Avenue
Madison, WI 53705
(608) 262-6966

Votrax Division of Federal Screwworks
(speech synthesizer)
500 Stephenson Hwy.
Troy, MI 48084
(800) 521-1350

* These programs require a separate commercially available speech synthesizer

Audiovisuals

Voice Input and Voice Output Technology: Computers That Talk and Computers That Listen. Division of Computer Research and Technology. Available from: DCRT Information Office, Building 12-A, Room 3027, National Institutes of Health, 9000 Rockville Pike, Bethesda, MD 20205. 3/4" videocassette, color, 22 minutes. 1980. Demonstrates two kinds of computer systems operated by disabled persons. One computer system has a voice box and speaks, and is operated by a blind programmer. The other computer system listens -- a quadriplegic programmer talks to it.

SOME SOURCES OF INFORMATION: COMPUTER ACCESS FOR BLIND PEOPLE

The Carroll Center for the Blind
770 Center Street
Newton, MA 02158
(617) 969-6200
Publishes Aids and Appliances Review.

Computer Aids
4528 S. Lafayette St.
Fort Wayne, IN 46806
(219) 456-2148

COPH 2 (Committee on Personal Computers and the Handicapped)
5225 N. Kenmore
Chicago, IL 60640
(312) 728-9879
Publishes Link and Go newsletter (print/tape). $8.00, quarterly.

Dialogue Magazine
"Technology" column
3100 South Oakpark Avenue
Berwyn Heights, IL 60402

Mr. Joe Giovanelli
Audio-Tech Laboratories
1158 Stewart Avenue
Bethpage, NY 11714
516/433-0171
Editor of BAUD (Blind Apple Users Group)

Harvey Lauer
2010 S. 7th Avenue
Maywood, IL 60153
(312)343-7959

Maryland Computer Services
Ted Henter
2010 Rock Spring Road
Forest Hill, MD 20150
(301) 879-3366
voice output

National Braille Press, Inc.
88 St. Stephen Street
Boston, MA 02115
617/266-6160
Published a Beginner's Guide to Personal Computers for the Blind, avail. tape/print/braille, $12.00.
Also publishes Braille Research Newsletter.

National Library Services
Regional libraries provide recorded material for people with any handicap, and Braille and large print material for blind persons. There are many books on computers available, mostly at the beginning level. "The Blind Data Processor" is a Braille magazine which provides good articles on the computer field, some of them quite advanced. Magazines such as Popular Mechanics and Science Digest also carry timely information on computers and software and are available from NLS.

Raised Dot Computing
David Holladay and Caryn Navy
310 S. 7th St.
Lewisburg, PA 17837
(717) 523-6739
Braille; newsletter available. Source of BRAILLE EDIT (word processor/braille translator program), Cramner Modified Brailler, and various interface guides, cables, and cards.

Sensory Aids Foundation
399 Sherman Avenue
Suite 12
Palo Alto, CA
415/329-0430
Publishes a very informative newsletter, Sensory Aids Technology Update. Published monthly; available in print or cassette. $30.00/year.

Smith-Kettlewell Institute of Visual Sciences
Rehabilitation Engineering Center
2232 Webster Street
San Francisco, CA 94115
(415) 563-2323

Solutions by Example, Inc.
375 Concord Avenue
Belmont, MA 02178
Source of PC Speak program; provides software interface between IBM PC and Votrax Type 'n' Talk, Votrax Personal Speech System, ECHO PC, or Intex Talker. Also source of Junior Speak, a program that interfaces the synthesizers with PCjr.

Street Electronics
1144 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
Source of the Echo II for the Apple II+ and IIe computers, and of the Echo PC for the IBM PC.

Telesensory Systems, Inc.
455 North Bernardo Avenue
P.O. Box 7455
Mountain View, CA 94943
415/960-0920
Manufactures and sells Optacon, VersaBraille, TeleBraille, SonicGuide, etc.

Triformation Systems, Inc.
3132 SE Jay Street
Stuart, FL 33497
305/283-4817
LED-120 Braille Printer, MicroBrailler paperless Braille device, Braille transcription services. Offers leases on its products.

TRACE CENTER INTERNATIONAL SOFTWARE/HARDWARE REGISTRY

The registry provides a common reference point to help handicapped computer users determine what software and hardware adaptations are available, and where additional information can be found. If you have any programs or hardware adaptations that will benefit handicapped computer users, please fill out this form (for software), or the form on the next page (for hardware), and send it to the Trace Center, Registry Coordinator, 314 Waisman Center, 1500 Highland Avenue, Madison WI 53705. For more information, call the Registry Coordinator at 608/262-6966.

TRACE CENTER INTERNATIONAL SOFTWARE/HARDWARE REGISTRY: PROGRAMS FOR HANDICAPPED INDIVIDUALS

SOFTWARE ENTRY FORM

PROGRAM NAME: _____

GENERIC NAME: _____

SORT CODES: _____
(see code explanation, next page)

PROGRAM DESCRIPTION: _____

_____

_____

_____

_____

_____

_____

_____

COMPUTER: _____

MEMORY REQ'D: _____

LANGUAGE: _____

ON DISK? _____ **TAPE?:** _____

COST: _____

MANUAL SIZE (PAGES): _____

AVAIL W/O PROG? (Y/N) _____

COST: _____ **REFUNDABLE W/PURCHASE?:** (Y/N) _____

SOURCE CODE AVAIL? (Y/N) _____ **COST:** _____

MACHINE READABLE MANUAL AVAIL? (Y/N & FORM):

_____

OTHER SOFTWARE REQUIRED (DOS, operating system, standard programs, etc):

_____

_____

_____

HARDWARE REQUIREMENTS (Standard, modified, or custom boards, accessories...):

_____

_____

OTHER NOTES (or continuations from items above):

_____

_____

_____

_____

_____

DEVELOPER: _____

_____

_____

PHONE _____

VENDOR: _____

_____

_____

PHONE _____

DATE WRITTEN: _____

PLANS FOR UPDATING?: (Y/N) _____

If possible, we ask that you provide a copy of your program, and/or documentation, with your completed entry form. Thank you.

TRACE CENTER INTERNATIONAL SOFTWARE/HARDWARE REGISTRY: HARDWARE ADAPTATIONS FOR HANDICAPPED INDIVIDUALS

HARDWARE ENTRY FORM

HARDWARE NAME: _____

GENERIC NAME: _____

SORT CODES: ___ ___ ___ ___ ___ ___
(see code explanation below)

HARDWARE DESCRIPTION _____

_____

_____

_____

_____

_____

_____

_____

COMPUTER REQ'D: _____

MEMORY REQ'D: _____

SOURCE CODE AVAIL? (Y/N) ____ **COST:** _____

COST OF ADAPTATION: _____

MANUAL SIZE (PAGES): _____

AVAIL W/O HARDWARE? (Y/N) ____ **COST:** _____

REFUNDABLE WITH PURCHASE? (Y/N) _____

MACHINE READABLE MANUAL AVAIL? (Y/N & FORM):

_____

_____

HARDWARE REQUIREMENTS (Standard, modified, or custom boards, accessories...):

_____

_____

SOFTWARE PROVIDED OR REQUIRED (DOS, operating system, standard program, etc.)

_____

_____

_____

OTHER NOTES (or continuations from items above):

_____

_____

_____

_____

_____

DEVELOPER: _____

_____

_____

PHONE: _____

VENDOR: _____

_____

_____

PHONE: _____

DATE DEVELOPED: _____

PLANS FOR UPDATING?: (Y/N) _____

SORT CODE EXPLANATION

A Alarm, Alarm/Call, and monitoring systems (including monitoring systems)
B Business Systems (other than writing/editing -- see W)
C Control Aids (including phone, self-care, environment control)
D Drawing Aids
E Evaluation/Testing
G Games (for handicapped individuals)
H Hearing Impaired
I Computer Aided Instruction (CAI)
J Vocational Placement
K Keyboard Modifications, Alternate Keyboards, and Non-Keyboard Input
M Mobility
P Portable Aids (battery operated, and less than 25 lbs [12 kg] including battery)
Q Cognitive Disabilities & Retraining
R Robots & Manipulators
S Speech Output (NOTE: Z = speech input/recognition)
T Telephone Communication
V Visually Impaired
W Writing/Editing
Z Speech Input/Recognition

Send to: Registry Coordinator, Trace R&D Center, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53705. For more information, call the Registry Coordinator at 608/262-6966.

Funding, Models, Policy, Statistics

FUNDING, MODELS, POLICY, STATISTICS 251

FUNDING 251

A FUNDING RESOURCE NETWORK? 251
FUNDING FOR DEVICES 251
SOME IDEAS FOR REDUCING PRODUCT COSTS 252
USED EQUIPMENT 252
EQUIPMENT LOANS 253
TAX DEDUCTIONS 253
DO-IT-YOURSELF 253
SELECTED PUBLICATIONS ON FUNDING FOR DEVICES 254
A NOTE ON FUNDRAISING 256

SERVICE DELIVERY MODELS 257

EXAMPLES OF SERVICE DELIVERY MODELS 257
A MODEL PROGRAM FOR SERVICE DELIVERY 257
AN INFORMATION AND ASSISTANCE CENTER 257
A PROJECT IN THE SCHOOL SYSTEM 258
AN INSTITUTION-BASED ADAPTIVE AID SERVICE 259
SELECTED PUBLICATIONS: DELIVERY MODELS 260

PUBLIC POLICY AND TECHNOLOGY FOR DISABLED PEOPLE 261

SELECTED PUBLICATIONS 261

TECHNOLOGY COST/EFFECTIVENESS/BENEFIT 262

STATISTICAL INFORMATION RESOURCES 264

A FUNDING RESOURCE NETWORK?

"...But the problem of payment for unique or adaptive devices remains.

"In seeking an answer to the cost question, I discovered from Dr. Justus Lehmann, University of Washington, Seattle, that they have solved the problem in their setting. They have on staff a person skilled at securing needed resources. This person tries every conceivable source -- public and private -- insurance, voluntary health organizations, service clubs, community organizations, churches. Dr. Lehmann reports that no truly needed device has been denied for lack of a sponsor. If you think this sounds too good to be true, some of you with this problem may want to write to Dr. Lehmann for advice."

> Douglas Fenderson, Ph.D.
> In "High Tech/High Touch", a keynote address, Discovery '83: Computers for the Disabled Conference Papers, edited by Janet Roehl. Available from Materials Development Center, Stout Vocational Rehab Institute, University of Wisconsin-Stout, Menominee, WI

There are several people around the country who are particularly good at locating the resources to pay for hard-to-fund equipment. Unfortunately, there is as yet no good mechanism for them to share information. RESNA has a subcommittee on Funding within the Service Delivery Committee. This Funding subcommittee could become the nucleus for a broader network of people. If you are interested in participating in a funding resource network, please contact RESNA.

FUNDING FOR DEVICES

Funding issues are generally the bottom line in providing technology for disabled people. We can research, develop, transfer to private sector, utilize, build and adapt, but if money is not available the device -- be it simple or sophisticated -- will not reach the intended user, the disabled individual.

In the U.S. Congress Office of Technology Assessment's Report Technology and Handicapped People (May 1982), the major conclusion was that "despite the existence of numerous important problems related to developing technologies, the more serious questions are social ones -- of financing, of conflicting and ill-defined goals, of hesitancy over the demands of distributive justice, and of isolated and uncoordinated programs."

If devices are to reach persons who need them, the issues surrounding funding must begin to surface so they can be dealt with. In this area of health and social welfare many, if not most, people are very uncomfortable putting the obvious needs of disabled individuals onto the same ledger line with money. But until the world is a more ideal place, we must live with these realities. To balance them in your favor, you need to know where to find funding and how to ask for it, what to do if it is denied, and the alternatives to direct funding.

Identifying Funding Sources and Resources

Knowing where to seek funds begins with a thorough exploration of the consumer's personal resources and his/her current or potential program eligibility. It is valuable to encourage the involvement of the individual and the family in determining and effectively using funding sources.

Potential funding sources include:

- o Personal or family income, including extended family and friends.
- o Loans, savings accounts, inheritances, trust funds, etc.
- o Private health insurance.
- o Government programs; e.g., Medicare, Medicaid, veterans' programs, crippled children's services, vocational rehabilitation programs, developmentally disabled programs, etc.
- o Voluntary health organizations such as United Cerebral Palsy Association, Easter Seal Society, Muscular Dystrophy Association.
- o Employer of consumer or family.
- o Labor union of consumer or family.
- o Workers' Compensation benefits.
- o School, as part of an Individual Education Plan.
- o Alumni associations.
- o Church group of consumer or family.
- o Civic and other community service organizations such as Elks, Sertoma Clubs, Quota Clubs, Lions Clubs, Kiwanis, Rotary Clubs.
- o Major corporation/corporate giving programs.
- o Private philanthropic foundation grants.
- o "Ear-marked gifts" sponsored through health organizations or medical facilities.
- o Special-event fund raising.

Funding time can be reduced by choosing the most likely resource(s), coordinating the efforts of client, family, and involved professionals, and including the durable medical equipment supplier in the process.

Writing for Results

Miracles do happen! Good-hearted neighbors might raise $1,000 over a weekend on the strength of hearing of a family need. People do give for people they care for. However, few public or private agencies, companies, or service organizations can work that way; they need paper.

The most effective way to prepare paperwork is to understand who is the intended receiver of the written document. The key is to know and understand your "audience" and the definitions and regulations they follow so that supporting documentation can be prepared appropriately. Someone must make a decision: What information is needed for a favorable response? You are writing for results: give neither more nor less data than needed. Too much information costs you extra effort to collect and write up; providing too little usually results in a second round of paperwork and/or an unfavorable judgement (i.e., no money and no equipment).

For "result-oriented writing" consider these factors:

Point of view: Know the audience you are writing for and ensure that all information can be understood from the reader's point of view. Who will read this report? What would you need to know if you sat behind his/her desk?

Determination of need: Supporting evidence of consumer's need is usually required, but must be described appropriately. For example, Medicare requires "medical necessity"; private insurance focuses on "improving the condition of the patient"; and with Medicaid you may need to emphasis "restoration of the patient to his best functional level."

Benefit to consumer: Never focus on the equipment and its features. Describe the benefits each feature will provide for the consumer.

Credibility: You probably will be seeking funding again; this is not an exercise in creative writing.

Additionally, funding sources are interested in knowing what their return on investment will be. A financial statement of how money will be saved as a result of the requested service and device, including the dollar amount, will be helpful. For instance, if some equipment will result in less attendant time, this should be reflected in the request. However, the cost-effectiveness issue is not always appropriate. It is great to predict a cost saving as the result of a certain device or service, but sometimes there is no change (or actually an increase) in total care costs as a result of a service. For example, a person acquiring a communication aid may need continued speech therapy to learn how to use the system effectively. Quality of life is often the issue. There may be an increase in care costs because a person is more independent and is able to make more demands on the system. In this case, do not stress costs; emphasize independence or whatever concept the funding agency needs to hear to make a favorable funding decision.

Following Through

Once the process of seeking funding has been initiated, persevere and appeal denials. The appeal process is educational for the third-party payer, and successful appeals are precedent-setting for future requests. They force review of general policies by the third-party organization. However, care must be taken in selection of the first case to be presented and in specifying criteria for effective use of the device and other services that will be required as part of the process (i.e., additional therapy).

If frustrations with the process inspire you to write long, impassioned reports, it would be more effective to send them to people who can actually change policy -- state and federal legislators. You are generally wasting your time targeting pleas for policy change to bureaucrats who are only following the rules they are paid to follow.

Alternatives to Direct Funding

As funding becomes more difficult to obtain, we are being forced to look at more charitable funding possibilities. Rehabilitation engineering services should not be philanthropy and, ideally, should not have to depend on philanthropy for funding. But until we reach the ideal world referred to earlier, becoming a more sophisticated "beggar" may help fund more devices. There are many nonstandard philanthropic sources locally. Some have never been approached. ASK. If the answer is "no" then ask "Do you know someone else I could ask?" Once you achieve a breakthrough, follow up with another request.

Other possibilities include reducing products costs and using tax provisions. The creative use of mass market products can bring some types of equipment into an affordable price range. "Do-it-yourself" construction is sometimes feasible. Rehabilitation engineering volunteer networks are developing in New Jersey and other places in the United States. Equipment can be purchased second hand or obtained on loan through clearinghouses and equipment loan closets. (editor)

SOME IDEAS FOR REDUCING PRODUCT COSTS

Used Equipment

A Used Equipment Referral Service has been established by the Metropolitan Center of Independent Living, Inc., in St. Paul. The service acts as a clearinghouse, matching disabled persons who need rehabilitative equipment with those who have used equipment available. All types of equipment are considered, including wheelchairs, bathroom equipment, ramps, lifts, vehicles, hospital beds, walkers, prone standers, etc. The service does not warehouse the equipment; instead it provides telephone referrals to those persons who have the equipment available throughout the state. The service also provides information on funding, repair and maintenance resources. Anyone interested in buying, selling, or donating equipment, or anyone interested in setting up a similar program, can contact Gary Tegrootenhuis, MCIL, 1728 University Avenue, St. Paul, Minnesota 55104, 612/646-8342.

The ASSISTIVE DEVICE bulletin board on SpecialNet can be used to list used assistive devices for sale or purchase. For information on SpecialNet, see the **Information Resources** section.

Other sources for this type of exchange are:

- ads in the local newspaper.
- bulletin boards at Independent Living Centers and Disabled Students Programs.
- ads in consumer publications such as Accent on Living and Mainstream.
- electronic bulletin boards such as WellNet, Compuserve, and The Source. (See section on microcomputer applications for addresses.)

Equipment Loan Programs

Easter Seals

Most local affiliates maintain an equipment loan program. Although details vary from one affiliate to another, a loan program usually maintains a supply of wheelchairs, crutches, canes and appliances for anyone who is in need. Upon acknowledgement by a physician or therapist, a chair or appliance can usually be loaned for the length of time it is required.

American Cancer Society

Local chapters frequently loan hospital beds for in-home use, and sometimes other equipment to people who have cancer.

Tax Deductions

Generally, any expenses incurred for medical care or equipment are deductible on an individual tax return and can be included with other medical expenses that would normally be deducted. Refer to IRS publications 502, Medical and Dental expenses; 503, Child and Disabled Dependent Care; 522, Disability and Payments; 552, Recordkeeping Requirements and a List of Tax Publications; and 907, Tax Information for Handicapped and Disabled Individuals. These are available at no charge from the Internal Revenue Office.

"151 Tax Deductions You Can Take" is a simple tax guide for the person with a disability, this monograph provides a listing of what is and what is not tax deductible. It is primarily a medical expense deduction guide and is therefore of particular value to persons with disabilities and their families. It includes information on the types of assistive devices that can be deductible. Written by Gregory Thomsen and Paul M. McInery, it is available from ACCENT Special Publications, P.O. Box 700, Bloomington, IL 61701 (20 pages; 1982)

Do-It-Yourself

An alternative to purchasing a piece of equipment is to make it yourself or hire someone else to construct it. There are references to D-I-Y material throughout this guide (e.g., the **TECHNOLOGY AT HOME** and **CONTROLS** sections).

Some of these references have been collected here; please refer to specific chapters for more information.

Aids and Adaptations. The Arthritis Society, 920 Yonge Street, Suite 420, Toronto M4W 3J7, Canada. Instructions for aids to make yourself.

Application and Construction Notes for Laptrays and Adaptive Pointers. 31 pages; $3.00. A packet containing application notes describing the construction of various adaptive interfaces and communication charts. Includes Wobble Stick Toy Control (for battery-operated toys), Adaptive Pointers (for communication boards and keyboards), Slide-Away and Swing-Away Laptrays (for wheelchair mounting), and Folding Communication Board (lightweight and highly portable).

Design and Construction of a Laptray. G.C. Vanderheiden. 30 pages; $3.00. 1977. This report provides basic information on the construction of a wheelchair laptray which may be used as a communication board. Included in this report are all of the drawings and directions needed to construct a laptray communication board using materials readily available from local hardware and department stores. Simple directions and guidelines are provided.

Easy to Make Aids for Your Handicapped Child. D. Caston. Souvenir Press, London. 1981

Equipment for the Disabled (series). Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB, England. 1984. Each volume in this series contains descriptions and illustrations of commercially available equipment for the disabled, as well as do-it-yourself ideas. Titles include: Communication; Clothing and Dressing for Adults; Home Management; Outdoor Transport; Wheelchairs; Leisure and Gardening; Disabled Mother; Personal Care; Housing and Furniture; Hoists and Walking Aids; Disabled Child.

Handbook for the Disabled: Ideas & Inventions for Easier Living. Chapter 30: "Make It Yourself." Suzanne Lunt. Charles Scribner's Sons, New York.

Handling the Young Cerebral Palsied Child at Home. N.R. Finnie. E.P. Dutton, New York. 1975.

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children and More Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children. Ms. Linda Burkhardt, 8315 Potomac Avenue, College Park, MD 20740.

Homemade Innovative Play Equipment. Information and Research Utilization Center in Physical Education and Recreation for the Handicapped. American Alliance for Health, Physical Education, Recreation and Dance, 1900 Association Drive, Reston, VA 22091, 703/476-3400. May 1973. 105 pages.

272

How to Build Special Furniture and Equipment for the Handicapped Child. R.B. Hoffman. Charles C. Thomas Co., Springfield, IL. 1970.

How to Make It Cheap Manual. Independence Factory, P.O. Box 597, Middletown, OH 45042. Volumes I and II, $1 donation plus postage; volume III, $2.75. Line drawings of aids you can make or have made, plus list of aids that can be ordered from this non-profit volunteer group.

An Instructional Playground for the Handicapped Using Tires as Inexpensive Playground Equipment: Activity and Construction Manual. University of the State of New York, State Education Department, Division for Handicapped Children, Special Education Materials Center, Albany, NY. 1975.

Making Aids for Disabled Living. S.E. Grainger. Batsford, North Pomfret, VT. 1981.

Playgrounds for Free: The Utilization of Used and Surplus Materials in Playground Construction. MIT Press, Cambridge, MA. 1974.

Please Help Us Help Ourselves. C. Nathan. United Cerebral Palsy of Central Indiana, Indianapolis, Indiana. 1970.

Rehabilitation Equipment and Devices Constructed in Wood. Institute of Rehabilitation Medicine, Publication Office, New York University Medical Center, 400 East 34th Street, New York, NY 10016. 1969. 102 pages. $2.00. Illustrates complete directions for constructing many devices, including kitchen cutting board, kitchen lapboard, and sewing and embroidery frame.

Strategies for Helping Severely and Multiply Handicapped Citizens. G. Greer, Robert M. Anderson, and Sara J. Odle (editors). University Park Press, Baltimore, Maryland. 1982.

"Teacher-Made Adaptive Devices for Archery, Badminton, and Table Tennis." J. Cowart. Practical Pointers, May 1978, (13), 1-16.

Therapeutic Devices, 1956-1976. J. Bellman, et al. American Journal of Occupational Therapy, American Occupational Therapy Association, Inc., 6000 Executive Blvd., Rockville, MD 20852. 112 pages. 1977. Do-it-yourself instructions for devices which have appeared in AJOT; includes wheelchair trays, ADL devices, communication aids, etc.

Toy Modification Note: Built-it-yourself Battery Insert. G.C. Vanderheiden. 18 pages; $2.00. 1982. Describes construction and operation of battery inserts to allow control of battery-operated devices by handicapped individuals without requiring modification of the toys themselves. Full diagrams and operating instructions included.

Vocational and Educational Aids. L. Brabyn. Smith-Kettlewell Institute Rehabilitation Engineering Center, San Francisco, CA. 1982.

Periodicals Featuring DIY Information

Accent on Living magazine has a regular feature called HOW TO, which lists ideas on adapting your own equipment. The Spring 1984 issue's HOW TO was entitled "Hanging In There" and presented solutions that two Accent readers have worked out for themselves, an electric lift and a hydraulic lift. Accent on Living is a quarterly magazine; their address is P.O. Box 700, Bloomington, IN.

Rehabilitation Gazette (Gazette International Networking Institute, 4502 Maryland Avenue, St. Louis, MO) also has DIY ideas in its annual publication.

Technical Aid to the Disabled Journal (Ryde, New South Wales, Australia) is published by Technical Aid to the Disabled, an Australian voluntary organization dedicated to designing and making aids for people with disabilities when such aids are unavailable commercially. The journal contains articles about the design, construction and use of aids, organizational news, and an information exchange.

Do-it-yourself devices can quickly move into the realm of "fugitive literature." Some examples of the kind of information available are:

Kit for Remote-Area Wheelchair: An Australian biomedical engineer has designed an inexpensive wheelchair that may be made from a kit or ordered assembled. The construction booklet is free to disabled individuals who wish to build a chair for their own use, but the chair is protected by patent from commercial production except where license to manufacture has been granted. The kit and chair are described in a free brochure from the designer: Robert Bosshard, Biomedical Engineer, Spinal Unit, Royal North Shore Hospital, St. Leonards 2065, New South Wales, Australia.

Plans for Making Mobility Devices for Children. To obtain free blueprints of a child's wheelchair and tricycle, write to R.J. Reynolds Tobacco Company, Winston-Salem, NC 27102.

Portable Rocking Bed Plans are available on loan from Rehabilitation Gazette, 4502 Maryland Avenue, St. Louis, MO.

This book does not help you make devices, it helps you install them. It is generally available at a good bookstore.

Home Security. Time-Life Books, Alexandria, VA. 1979. This self-help book on home security includes a section on accident-proofing a house, which has 13 pages of directions and sketches for reducing dangerous conditions in bathrooms and on stairs. Features instructions for installing grab bars, slip-resistant surfaces, stair rails, and outdoor access ramps.

Publications with Information on Funding Devices

"Financing Adaptive Aids." Sensory Aids Technology Update, December 1983, pages 2-3. Available from: Sensory Aids Foundation, 399 Sherman Avenue #12, Palo Alto, CA 94306. Describes several programs that offer financial aid and/or low interest loans for the purchase of sensory aids for the blind.

Funding Book: The Many Faces of Funding.... Anna Hoffman. Available from: Phonic Ear, Inc., 250 Camino Alto, Mill Valley, CA 94941. $25.00 (includes the Monthly Newsletter, shipping and packaging). Although focused on funding strategies for communication devices, the information is also readily applicable to funding for other types of equipment.

The book, a three-ring looseleaf notebook, is divided into five sections: the Overview provides highlights of sources of funding on the federal, state, educational, insurance and private levels; Method of Procedure informs on how to package funding applications; Case Histories inspires ideas through "how to" stories; Legislation informs on any changes in federal, state or local laws; and the Monthly Newsletters provide the most current funding information, and keeps the book current and updated.

"Funding Challenges" Myra Williams. In Seating for Children With Cerebral Palsy: A Resource Manual, Elaine Trefler, editor. Available from: University of Tennessee, Rehabilitation Engineering Program, 632 Court Avenue, Memphis, TN 38163. $20.00. 1984.

Funding of Mobility Equipment: Current Issues and Strategies. Virginia Ruggles. Muscular Dystrophy Association, 810 7th Street, New York, NY 10019. September 1981.

Funding of Non-Vocal Communication Aids: Current Issues and Strategies. Virginia Ruggles. Muscular Dystrophy Association, 810 7th Street, New York, NY 10019. 30 pages.

Funding: The Bottom Line. S. Enders, A. Blote, and C. Reed-Heumann. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, 1983. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

Guidelines for Seeking Funding for Communication Aids. Donna DePape and Lavonne Krause. Trace Center, Waisman Center, University of Wisconsin-Madison, Madison, WI 53705. 44 pages. Revised 1980.

Health Insurance Benefits and Communication Disorders. Steven White, Ph.D. Director, reimbursement policy division, American Speech-Language-Hearing Association. In Shhh, November/December 1982, 4848 Battery Lane, Bethesda, Maryland 20814.

Insurance Reimbursement Mechanisms for Rehabilitation Equipment and Environment Modifications. M Mittleman and J. Settelle. Archives of Physical Medicine and Rehabilitation, 63: 279-283, 1982.

Report on the Advanced Topical Discussion: Funding Strategies for the '80s. RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814, August 1982.

Selected Funding Issues in Rehabilitation Engineering Service Delivery. Rick N. Holte, M.Sc. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

These periodicals regularly provide information related to equipment funding strategies:

Accent on Living
Cheever Publications
P.O. Box 700
Bloomington, IN 61701

Bulletin on Science & Technology for the Handicapped
AAAS
1776 Massachusetts Avenue
Washington, DC 20036

Communication Outlook
Artificial Language Laboratory
Computer Science Department
Michigan State University
East Lansing, MI 48824

Sensory Aids Technology Update
Sensory Aids Foundation
399 Sherman Avenue #12
Palo Alto, CA 94306

These publications provide an overview of the financial aid programs and special services available to the disabled person, primarily on the federal and state levels. Although not oriented specifically toward funding devices, each covers a broad range of programs which focus on such areas as basic living needs, education and employment. Major programs are identified which exist throughout the nation, or could exist if a particular state or community elected to participate in a program.

"Financial Aid and Special Services", Chapter 15. Virginia M. Gives. In Disability and Rehabilitation Handbook, Robert Goldenson, editor. McGraw-Hill, Inc. 1978.

Financial Resources for Disabled Individuals. Institute for Information Studies, Falls Church, Virginia. Available from: NARIC, Catholic University, Washington, DC. 75 pages. $11.00. 1980.

"How to Get Government Money, Home Care, Tax Breaks, and Other Help". Chapter 28 in A Handbook for the Disabled: Ideas & Inventions for Easier Living. Suzanne Lunt. Charles Scribner's Sons, 597 Fifth Avenue, New York, NY 10017. 276 pages. $17.95. 1982.

Most geographic areas have some type of Community Service Council, usually operational on a citywide

or countywide basis, which can be an additional and valuable resource in finding specific programs on a local level.

Information on new programs which could be used to pay for assistive devices can be found in publications such as Communication Outlook, and the monthly updates the The Many Faces of Funding. The following is from Communication Outlook, Winter, 1984, page 12.

"Public Service Community Development Block Grant Funds are awarded to cities by the federal government to both provide new services and increase the public services already available to individuals experiencing handicaps. Several years ago, the city of Fort Collins, Colorado began using these funds to provide nonverbal individuals with communication aids. The city carefully monitors the acquisition of these aids and for five years considers them the property of the city for depreciation purposes, although users maintain exclusive use of the devices.

"This project has also encouraged community advocacy, heightening public awareness of its citizens' needs. Most importantly, the new augmentative system user is able to communicate with city government and elected officials.

"Beginning in March 1984, Block Grant Funds will be set aside in each receiving city to operate a needs assessment for individuals experiencing handicaps. Funds will be allocated based upon proposals submitted to each city. Those interested should contact their city regarding the Public Service Community Development Block Grant Fund, Section 570.201, Circular A-102, Attachment O."

If you want to learn more about funds available from the federal government, refer to:

"The Who, What, When and How of the Federal Funding Process". Donald Barrett. In Programs for the Handicapped. Available from: Clearinghouse on the Handicapped, Department of Education, Washington, DC. An overview of the federal funding process in the disability field, intended to direct first-time grant seekers to the proper source for information. Include a "Resources for Funding Information" section which lists a variety of organizations and publications which offer more detailed information on this subject.

To receive the current information on relevant federal funding programs, you might consider subscribing to:

Education of the Handicapped. The Independent Bi-Weekly News Service on Federal Legislation, Programs and Funding for Special Education. Published every other Wednesday. $157/year.

Federal Grants & Contracts Weekly. Selected Project Opportunities for the Education Community. Published every Tuesday. $157/year.

Both are available from:

Capitol Publications, Inc.
1300 North 17th Street
Arlington, VA 22209
703/528-5400

You'll notice that these are not inexpensive. If not available at your local library, you might see if the grants and contracts office of your nearest major university subscribers and would let you read them.

A FINAL NOTE ON FUNDRAISING

If you and/or your agency are working on obtaining funding for devices, it is important to avoid being overwhelmed by the magnitude of the problem. If you find more and more of your worktime (and after work time) being consumed by funding problems, it may be time to reassess the situation.

IDENTIFY whose responsibility fundraising is.

EVALUATE the input needed -- it can take considerable effort to get the ball rolling.

If you can't afford the time, DEVELOP a network of people who can do it or help you.

IDENTIFY the rewards -- what they are, and who gets them.

If all else fails, you might tack a notice on the wall:

"TAKE THE 'D' OUT OF FUNDRAISING!"

and reapply the above guidelines. Good luck!

SERVICE DELIVERY MODELS

There probably are as many definitions of service delivery as there are agencies providing it. However, the following working definition is provided:

> Service Delivery is a process/system which provides evaluative and/or advisory services, and/or technical devices to disabled persons to increase their independence and productivity.

These services are provided on a cost-effective basis with the eventual outcome the improvement of the quality of life.

Service delivery agencies are listed throughout this resource guide. Each has its own approach to providing technology to disabled people. For more specific information on their individual programs, please contact the organizations directly.

There are several frameworks for looking at service delivery. Some are listed in this section. Information on others can be found in the Prosthetics/Orthotics literature. The many Independent Living Programs (ILPs) across the country can provide help in selecting, obtaining and using assistive devices -- but most of them don't have a formal "equipment" service, so it's easy to overlook their model as a service delivery approach. Unfortunately, most of the ILP information relevant to this field is not written up; you will have to contact the programs directly.

EXAMPLES OF SERVICE DELIVERY MODELS

A MODEL PROGRAM FOR SERVICE DELIVERY

Project Threshold is a model program for delivery of rehabilitation engineering services in the State of California. It was designed to meet the unique needs of severely disabled clients who require specialized assistance in performing tasks of daily living, assistance with management of attendant time and activities, and/or performance of school and job related tasks. The client's needs are met by identifying problem areas and then working out solutions to the problems, thus increasing the client's level of independence. For more information on how this is done, see the section on EQUIPMENT SELECTION by Kathy Bowman, Project Threshold, in this Sourcebook.

One component of the Rehabilitation Engineering Center and Project Threshold is the Rehabilitation Equipment Demonstration Unit (REDU) established by the National Institute for Handicapped Research (NIHR) of the United States Department of Education. Selection of Rancho Los Amigos Hospital as a site for a REDU has been invaluable to Project Threshold. The purpose of the REDU is to assist disabled individuals with selection of appropriate equipment by providing product information and opportunities for equipment trial. The REDU at Rancho is housed in a building called the Model Home, which is stocked with numerous assistive devices and rehabilitation equipment. Project Threshold clients use the REDU equipment during evaluations; the Model Home setting provides a realistic environment for this equipment trial.

Project Threshold was funded initially through an I&E grant and later as a block-funded contract with the Department of Rehabilitation with the goal of providing direct services to disabled clients in the areas of independent living and independence with school and job related tasks. Follow-up with clients and counselors indicates satisfaction with the program. Project Threshold has evolved into a model program which is being explored by other agencies nationwide who are interested in developing similar programs for the severely disabled.

Project Threshold is an example of a successful cooperative relationship between a rehabilitation engineering program and a state vocational rehabilitation agency.

For more information, contact Nancy Somerville, Project Threshold, 500 HUT, Rancho Los Amigos Hospital, Downey, CA.

AN INFORMATION AND ASSISTANCE CENTRE

The PAM ASSISTANCE CENTRE provides information about assistive devices old and new -- what they are, what they cost, how they might be secured. The center has a reputation for being innovative and practical.

The Centre offers information from more than 1,500 companies, and more than 10,000 products. Sometimes a homemade device or the innovative use of some standard item is suggested. If the services of other persons, such as a rehabilitation engineer or an artificial language specialist, are required, the Centre acts as a linker. Additionally, the Centre displays provide hands-on experience with many assistive devices. The Centre has a trained ABLEDATA broker on staff.

Centre staff specialize in problem-solving, working with medical personnel, special educators, parents and directly with any persons for whom special equipment may be of benefit. Any handicapped individual is eligible for Centre help.

without cost or "red tape."

PAM is a service for Michigan, although out-of-state requests also may be honored. A majority of requests for problem-solving are initiated by phone. All ages are eligible for service. The special education population (ages 0-25), rehabilitation clients, and older persons are included. Physically handicapped, deaf, blind, or multiply handicapped individuals often find the Centre helpful.

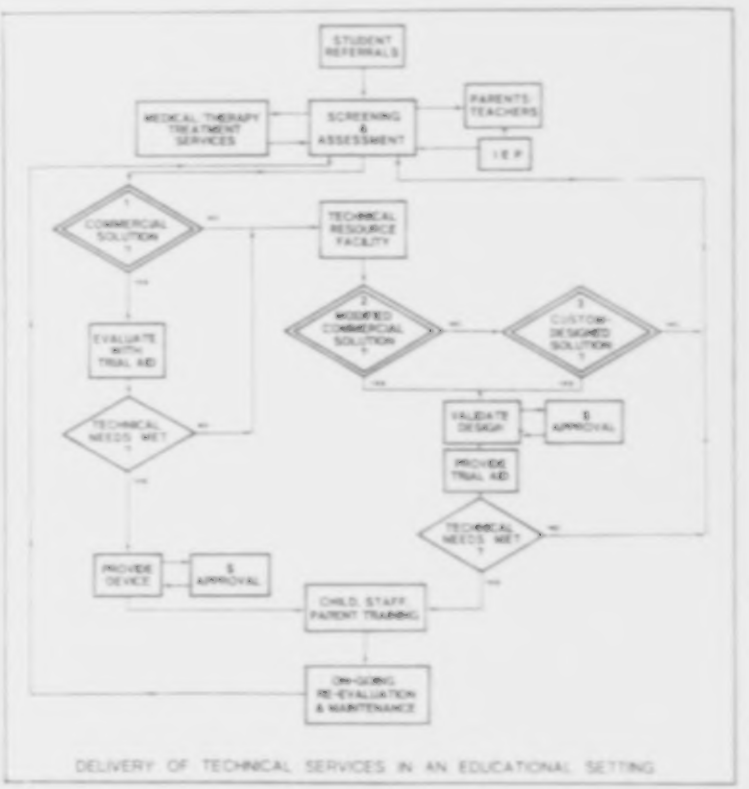
For more information, contact PAM Centre, 601 Maple, Lansing, MI, 517/371-5897.

A PROJECT IN THE SCHOOL SYSTEM

In July, 1978, The Bureau of Education for the Handicapped awarded a three-year demonstration grant to the Memphis City Schools, Division of Special Education. One objective of this grant was to demonstrate that severely physically handicapped children could participate more meaningfully in their educational program with the assistance of technical aids in the areas of communication, seating, mobility, feeding, and toileting. Technical services were contracted from the University of Tennessee, Rehabilitation Engineering Center to provide and modify appropriate aids. The project developed a model for the delivery of technical aids in an education setting, and designed an instrument to aid in the prescription of technical aids.

The full report, Project TEACH: Technical Educational Aids for Children with Handicaps, A Model and Demonstration Project, may be ordered at $5.00 each from the Division of Special Education, Memphis City Schools, 2597 Avery Avenue, Memphis, Tennessee 38112.

For a summary of some of the findings related to technology, see the **TECHNOLOGY IN THE CLASSROOM** section in this Resource Guide.



DELIVERY OF TECHNICAL SERVICES IN AN EDUCATIONAL SETTING

AN INSTITUTION-BASED ADAPTIVE AID SERVICE

The Commonwealth of Massachusetts Department of Mental Health supports six adaptive design services, one in each of the six state schools. The following is a description of the Region I Adaptive Design Service.

"...The program was established in 1977 to help meet the needs of the most severely disabled residents of the Belchertown State School in cooperation with and complementing the existing therapeutic, medical and educational services. For the past three years, services have been extended to DMH clients outside the institution (including many former state school residents), and nearly half our time is now devoted to community projects. We have continued to focus on those needs of the most severely disabled which cannot be met through commercially available equipment. Our primary goal has been to design and build comfortable, stable, and safe positioning systems for these people, seeing good positioning as a prerequisite for any other skills. Most often we do this by modifying standard wheelchairs, sometimes quite drastically, to provide very specific and individualized support. We also design and build pieces of equipment to aid clients with self care activities like eating and dressing, communication, and school and work-related activities. Our environmental design services include custom design of wheelchair ramps, accessible bathrooms, work station modifications and recommendations for commercial equipment to increase a client's independence within his or her environment. Although the emphasis of the program has been on service delivery, the philosophy and funding structure have allowed time for researching technical and clinical developments and availability of equipment on the commercial market."

Adaptive Equipment Services

Region I Adaptive Design Services, Belchertown State School, Box 42, Belchertown, MA 01007.

Alternative Design, Wrentham State School, Box 144, Wrentham, MA 02093.

Adaptive Design Services, Paul A. Dever State School, Taunton, MA 02780.

Therapeutic Equipment Clinic, Fernald State School, 200 Trapelo Road, Waltham, MA 02172.

Adaptive Equipment Clinic, Hogan Regional Center, Hathorne, MA 01937.

Adaptive Equipment Services, Monson Developmental Center, Drawer "F", Palmer, MA 01069.

A similar program exists in the state of California. For more information, contact Mobility Engineering, Sonoma State Hospital, Eldridge, CA 95431, 707/938-6445.

To find out if your state has such a service, contact the agency responsible for Developmental Disabilities.

PUBLICATIONS ON SERVICE DELIVERY MODELS

Assistive Devices for Handicapped Students: A Model and Guide for a Statewide Delivery System. National Association of State Directors of Public Education, 1201 Sixteenth Street, NW, Washington, DC 20036, 202/844-4193. 27 pages. $4.50. 1980. This publication describes an ideal model for a comprehensive assistive device center that can provide a cost-effective, coordinated delivery system to assure that handicapped students who need adaptive aids and equipment have access to them and are trained in their most efficient use. The document includes a guide for implementation of the model and a comprehensive listing of available resources throughout the country.

"Delivery of Assistive Devices Through a Client Oriented Approach." A.M. Cook. In Technology for Independent Living, V.W. Stern and M.R. Reddon, editors. AAAS, 1776 Massachusetts Avenue, Washington, DC 20036. 1982.

"Models of Clinical Evaluation Centers for Communication Aids." A.M. Cook. Proceedings of the 1982 Distech Conference, The Spastics Society, London, England. 1982.

Project TEACH: Technical Educational Aids for Children with Handicaps, A Model and Demonstration Project, may be ordered at $5.00 each from the Division of Special Education, Memphis City Schools, 2597 Avery Avenue, Memphis, Tennessee 38112. 1981. Describes a project to direct rehabilitation engineering to the needs of children with severe neuromuscular and communication deficiencies. Aids and devices were designed or adapted to assist in communication, seating, mobility, feeding, and toileting. The program included a technology section, services to children and to parents. Includes case studies, project newsletters, forms, data sheets, and photographs. The project was conducted in cooperation with the University of Tennessee Rehabilitation Engineering Program.

"A Proposed Evaluation Methodology for Rehabilitation Engineering Decision-Making." P. Platt and D.A. Hobson. Proceedings of the International Conference on Rehabilitation Engineering, Toronto, Ontario. 1980.

"Selected Funding Issues in Rehabilitation Engineering Service Delivery." R. Holte. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

"The Service Delivery Process." C. Greg Shaw. Chapter 13, in Seating for Children with Cerebral Palsy: A Resource Manual, Elaine Trefler, Editor. University of Tennessee, Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163. $20.00. 1984.

"Towards a Theoretical Framework of Service Delivery." R. Levy. Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego. Available from: RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1983.

Interagency Cooperation

These references do not deal specifically with device delivery, but could prove useful if the approach you develop involves developing interagency cooperative agreements, and/or gets involved with the home health care market.

Handbook on Developing Effective Linking Strategies: Vocational Education Models for Linking Agencies Serving the Handicapped. Wisconsin Vocational Studies Center, University of Wisconsin-Madison, Madison, WI 53706. 1982. Although this book is focused to vocational education models, the strategies they use could be useful to organizations or agencies trying to implement rehabilitation engineering services and/or interagency technical aids projects. The bibliography in this book lists reports on exemplary programs in several states.

Home Care/Health Care

How to Establish a Home Health Agency: Some Preliminary Considerations. Publication 84-1. National Association for Homecare, Research Division, 519 C Street NE, Washington, DC 20002. $12.00. The National Association for Home Care has published a booklet advising persons considering entry to the home care field of the steps necessary for establishing a home health agency. The goal of the publication is to ensure that persons or organizations considering entering home care know all the state and federal requirements and NAHC's code of ethics.

Planning for Home Health Services: A Resource Handbook. U.S. Department of Health and Human Services. Available from: National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. Specify Publication [illegible] 0102001. Free. A guide for planners of home health care services. It can be a particularly useful tool for new agencies.

Software Catalog of Computer Programs for the Health Care Industries. Moore Data Management Services, 1660 South Highway 100, Minneapolis, MN 55416, 612/540-1033. $39.95.

Sound Business Practices

Little has been written on the business operation aspects of specialized assistive device services. However, there is a considerable amount written about business practice and funding issues in the durable medical equipment (DME) trade magazines. If you are concerned with operating a service in the black, you might contact organizations such as National Association of Medical Equipment Suppliers (NAMES), and attend some of the DME/Home Care trade shows to learn more about the commercial perspective, and what you can learn from it.

POLICY-RELATED PUBLICATIONS ON TECHNOLOGY FOR DISABLED PEOPLE

The Application of Technological Developments to Physically Disabled People. Joseph La Rocca and Jerry S. Turem. Publications Office, Urban Institute, 2100 M Street NW, Washington, DC 20047. 117 pages. $3.50. 1978.

Application of Technology to Handicapped Individuals: Process, Problems, and Progress. U.S. Government Printing Office, 60-3190, Washington, DC 20402. April, 1980. A joint report for the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, U.S. House of Representatives, and the Subcommittee on Labor and of the Committee on Human Resources, U.S. Senate, 96th Congress.

Health Technology Case Study Report #25. Prepared as a background paper for Technology and Handicapped People. Office of Technology Assessment, U.S. Congress. 1982. One third of the report covers the area of "Information and Funding for the Speech Impaired." It provides an analysis of funding issues related to communication aids.

A Research Agenda on Science and Technology for the Handicapped. Janet Welsh Brown and Martha Redden. American Association for the Advancement of Science, 1776 Massachusetts Avenue NW, Washington, DC 20036. 54 pages. 1979.

Suggested Approach for Establishing a Rehabilitation Engineering Information Service for the State of California. Lo F. Christy, Gail Kelton-Fogg, Ruth Lizak and Cynthia Vahlkamp. SRI International, Menlo Park, California. 271 pages. 1978.

Technology and Handicapped People. U.S. Congress Office of Technology Assessment (OTA). 1982. Summary available from: OTA, Congress of the U.S., Washington, DC 20510. Full report available from: S/N 052-003-00874, Superintendent of Documents, Government Printing Office, Washington, DC 20402. $7.00. This is an excellent analysis of the entire field of applied technology for disabled people.

The Use of Technology in the Care of the Elderly and the Disabled: Tools for Living. Jean Bray and Sheila Wright, editors. Greenwood Press, Westport, Connecticut. 1980. Based on papers at two symposia held in London and Berlin in 1979 under the sponsorship of the Commission of the European Communities. The main focus of this book is on ways and means of putting better products at the service of the elderly and the disabled. In presenting a collection of international papers by industrialists, government officials, financiers, experts from consumer protection services and charitable organizations, as well as those working daily in the field, this study sets out to provide a blueprint for understanding how the development of new and adapted products can most constructively be translated into practical help for the elderly and the handicapped.

These publications address the broader public policy issues related to disabled people. Each of these references includes references to technology use by physically disabled individuals:

Handicapping America: Barriers to Disabled People. Frank Bowe. Harper & Row, 10 E. 53rd Street, New York, NY 10022. 254 pages. $14.95. Introduction to disability, attitudes, architectural and transportation barriers, and programs affecting handicapped Americans.

"Physical Disability and Public Policy." Gerben DeJong and Raymond Lifchez. Scientific American, Vol. 248, No. 6, pages 40-49, June, 1983. This article examines U.S. policy with respect to citizens with disabilities. The authors summarize the existing knowledge of the dimensions of disability and the growth patterns over the past twenty years, discuss the extent to which disability laws have been implemented, and suggest necessary economic ingredients for a working disability policy in today's political and economic climate. A major focus of the article is the area of architectural accessibility. Complementing the article are charts and graphs illustrating the federal disability laws and the demographic information.

Rehabilitating America: Toward Independence for Disabled Americans. Frank Bowe. Harper & Row, 10 E. 53rd Street, New York, NY 10022. $12.95. Discusses the economics of disability and age. This book has many useful statistics for demonstrating the effectiveness of rehabilitation.

The White House Conference on Handicapped Individuals, Awareness Papers, Vol. 1. George Washington University, School of Medicine, Washington, DC. 466 pages. 1977.

The Unexpected Minority: Handicapped Children in America. John Gliedman and William Roth for the Carnegie Council on Children. Harcourt Brace Jovanovich, New York, NY. $17.95. This fifth and final report from the Carnegie Council on Children comes to a stunning conclusion: no other minority group has its social and political oppression so thoroughly masked as the 10 million handicapped children and 30 million handicapped adults in America. This book is the first comprehensive study to apply a civil rights lens to the problems of both handicapped children and adults. As the authors make clear in this analysis, it is the social rather than the biological aspects of disability that doom so many handicapped children and adults to stunted and useless lives. The authors also propose a radically new approach to disability.

INFORMATION ON TECHNOLOGY: COST/EFFECTIVENESS/AND BENEFIT

EMPLOYMENT-RELATED TECHNOLOGY FACTS & FIGURES .

Accommodation Can Be Reasonable: A Study of Accommodations Provided to Handicapped Employees by Federal Contractors: Berkeley Planning Associates, in collaboration with its subcontractor, Harold Russell Associates, produced this study for the Department of Labor (DOL). It is the first national survey concerning accommodation practices for disabled employees of private sector employers who contract with the Federal government.

Some of the findings of this study include:

An overall conclusion of the analysis is that for firms which have made efforts to hire workers with disabilities, accommodation is "no big deal." Rarely did an accommodation involve much cost; **51% of those reported cost nothing; an additional 30% cost less than $500; and only 8% cost more than $2,000.**

Accommodations for individual workers take many forms, including the following: training and transfers (14%); job modification and restructuring (23%); orientation of staff and supervisors (18%); special equipment and assistance (15%); work environment and location changes (21%); and other (9%). No particular type of accommodation dominates. Most workers receive more than one kind of accommodation.

The most expensive and extensive accommodations tended to be provided to the blind and those who use wheelchairs. Higher skilled workers were more often provided environmental adaptations of the work place or special equipment than lower skilled workers. Lower skilled workers were more likely to receive job redesign accommodations, retraining, or selective placement.

Accommodation efforts are generally perceived as successful in allowing the worker to be effective on the job. Firms frequently reported that the accommodation would benefit the employee if promoted to a new job and also stated that often other nondisabled workers also benefited from the accommodation.

Availability of the report is limited at this time, but inquiries should be directed to:

Mr. Thomas Hodges, Development and Research, Employment Standards Administration, Dept. of Labor, Room C-3313, 200 Constitution Avenue NW, Washington, DC 20210, 202/523-9145.

Disability Management Today: The bi-monthly publication covering business issues of employment of disabled persons. Michael Zullo, editor. Available from: Mueller & Zullo, Inc., 16 Hudson Street, New York, NY 10013, 212/732-5557.

Succinct well-written articles contain information and statistics which could be useful in documenting the need and cost-effectiveness for various technology-related services. For example, in Volume I, Issue 3, "The Costly Back," Richard Canter lists facts such as:

"After headaches, back pain is man's most common and intractable complaint.

"80-90% of all Americans will suffer significant back pain sometime in their lives.

"In the United States, there are an estimated 75 million people with back problems.

"There are 7 million new victims of back pain each year. Of these, 5 million are partially or temporarily disabled, and 2 million will be unable to work at all.

"Back pain ranks second only to upper respiratory infections in terms of work time lost due to illness.

"There are 93 million workdays lost each year due to back pain and $5 million spent annually for diagnostic and treatment procedures.

"An estimated 200,000 Americans will have back surgery each year. A third of these will have additional surgery, usually fusion.

"Disc disorders occur more frequently in the prime of the worklife expectancy, ages 30-40.

"Once an individual has had a back problem, he is 10 times more likely to suffer problems again."

and another article, "Disability Does Affect the Economy," states:

"Some of the causes of current high interest rates can be directly attributed to disability costs. In 1981, 40% of Social Security benefits went to medical payments or disability income. In addition, $150 billion or 8% of the GNP was spent on transfer and medical payments. This money spent by government and industry should go to capital investment, which in turn would add to a healthy economy. Companies could reduce these staggering figures by both improving in-house disability management programs and employing qualified disabled individuals."

In "Engineering Aids Reduce Barriers to Employment for Severely Handicapped Clients," Rehab Brief, Volume 1, No. 8, August 1978. Available from: National Institute of Handicapped Research, Department of Education, Washington, DC 20202.

"Making low-cost changes in work environments helped clients perform more job-related physical tasks. As a result, productivity of many of these clients equals or surpasses that of nondisabled employees doing the same tasks. State vocational rehabilitation agencies paid for purchased equipment and materials for custom-designed aids. The average cost per client was $153, with the range from $0 to $1,806. The average time required to fabricate devices or install purchased devices was 2.1 hours, with the minimum 0 and the maximum 30 hours.

252

INDEPENDENT LIVING TECHNOLOGY: FACTS AND FIGURES

Project Threshold has been described in other sections of this Resource Guide (**EQUIPMENT SELECTION PROCESS, SERVICE DELIVERY MODELS**).

It is significant to note that despite the fact that all clients served by Project Threshold are severely disabled, in 77% of these cases the solution involved adaptive behavior and/or commercially available devices, and resulted in lower average costs per client. Only when these more conservative methods had been exhausted did they turn to custom modification and fabrication of equipment for problem solution. This occurred in 23% of the cases. After developing and refining their systematized approach to service delivery, they have noted growth and changes in the program. Initially, the vast majority of solutions involved custom devices; now the majority of solutions are found in adaptive behavior and/or commercially available equipment.

Service Categories	Percentage of Cases
Problem identification and/or adaptive behavior recommendations	20%
Evaluation and recommendation of commercially available equipment	57%
Evaluation and modification of commercially available equipment	9%
Evaluation and custom design and fabrication of equipment	14%

Service Category Statistics for Project Threshold 1982-82 (Total=80 clients)

SEATING & POSITIONING DEVICES: FACTS & FIGURES

"Provision of Assistive Equipment for Handicapped Persons." J. Kohn, MD, S. Enders, OTR, J. Preston, Jr., MSW, W. Moltoch, CO. Archives of Physical Medicine and Rehabilitation, Vol. 64, August 1983, pages 378-381. Data from the National Health Survey (1977), US Vital and Health Statistics, indicated that 645,000 persons require the use of a wheelchair. At the 1977 median cost of $700 per wheelchair, the total expenditures in the United States totalled more than $550 million. Data concerning costs, service delivery problems, and equipment life span were not available in the literature. The evaluation of these factors appears to be a major gap in measuring the success of rehabilitation engineering services and research. In this study, effectiveness and relative costs of mobility-postural seating were evaluated in 196 clients. Of the 196 to whom a questionnaire was sent 138 (70%) responded and 49 (25%) were selected for personal interview. Demographic data were comparable in the 3 groups. Eighty-eight percent were entirely nonambulatory; 54% received electric wheelchairs. In the 49 clients visited 79% of the devices were rated optimal or close to optimal in performance; 21% were rated limited or unsatisfactory. Fifty-two percent were being used currently. 23% had been outgrown and replaced, and 25% were not being used for other reasons. Of the devices in use, the average duration time was 25 months and the average time in use per day was 9 hours. For the devices which had been outgrown, the life span of the device was 30.9 months and the cost per day was about $1.50. Implications of the findings are discussed and recommendations are made for better assessment, follow-up and evaluation of both the assistive devices and the service process.

The full report of the study in this paper is entitled: Team Assessment of Device Effectiveness: A Retrospective Study, by J. Kohn, MD, S. Enders, OTR, J. Preston, Jr., MSW, W. Moltoch, CO. It is available from Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304.

LIFETIME COSTS

The following chart is reprinted with permission from "How Much Is Your Disability Worth?," Accent on Living, Summer 1981. The article discusses the use of a human factors analyst to determine the cost of a disability.

"The following is the summary of the goods and services needed by a 23-year-old who lost one hand and most of the other in a punch press machine accident. The figures are based on an ergonomics study done in 1978. The figures cover costs for him over his remaining life span to meet his disability related needs. No amounts are allowed for extra medical expense, insurance coverage, or earning losses.

Major Categories	First-Year Costs	Total Life Span Costs (without inflation)
A. Prosthetic Aids and Services	$7,912	$90,966
B. Special Exercise Aids and Physical Therapy	$840	$8,820
C. Dressing Aids and Clothing Modifications	$4,031	$75,273
D. Special Home Aids, Furnishings, and Modifications	$11,896	$52,370
E. Travel Aids and Special Automobile Features	$4,833	$36,679
F. Special Vocational Aids and Counseling	$7,202	$34,773
G. Special Recreative	$2,030	$6,270
H. Assistance and Extra Services	$4,321	$185,803
TOTALS	$43,115	$490,954

"Application of Dimensional Analysis in Determining Cost/Benefit of Handicapped Devices." Brian R. Drufke, P.E., Selyn W. Becker, Ph.D. Proceedings of the Fourth Annual Conference on Rehabilitation Engineering, Washington, DC. Available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814. 1981. This paper presents a generalized method of performing cost/benefit analysis on aids and devices for the handicapped using dimensional analysis. The utility of the method presented is that both objective and subjective selection factors influencing the cost benefit analysis can be considered simultaneously. Additionally, this analysis method allows dissimilar devices or aids designed to compensate for the same loss of function to be compared with each other or against a chosen benchmark.

IS COST EFFECTIVENESS THE ANSWER?

Before we get too caught up in looking at ways to produce evidence of cost effectiveness, it is important to look at the results of this OTA study.

The Implications of Cost-Effectiveness Analysis of Medical Technology, Office of Technology Assessment, Congress of the United States, Washington, DC 20510. August, 1980.

"The rapid and continuing growth of expenditures is a central issue in many policy decisions concerning the medical care system of the United States. Policymakers, health professionals, and consumers are seeking ways to control this growth while simultaneously improving the quality of health care. Increasingly, the use of cost-effectiveness analysis/cost-benefit analysis (CEA/CBA) is being advocated as a possible means of making the medical care system more efficient. In particular, this technique is suggested for use in health care programs -- for example, by the medicare program in its reimbursement coverage decisions. Nevertheless, a great deal of confusion and disagreement surrounds the implications and feasibility of applying CEA/CBA in health care. To aid in their decisions concerning the ...ble use of CEA/CBA in Federal health programs, the Senate Committees on Labor and Human Resources and on Finance asked OTA to explore the applicability of CEA/CBA to medical technology.

"The primary focus of the assessment is on the application of CEA/CBA to medical technology, i.e., the drugs, devices, medical and surgical procedures used in medical care, and the organizational and support systems within which such care is provided.... The findings of this assessment, though, might very well apply to health care resource decisionmaking in general, and with modification, to other policy areas such as education, the environment, and occupational safety and health.

"This OTA assessment finds that CEA/CBA cannot serve as the sole or primary determinant of a health care decision. Decisionmaking could be improved, however, by the process of identifying and considering all the relevant costs and benefits of a decision. At present, using the approach or process of CEA/CBA in decisionmaking may be more helpful than the rigid and formal application of CEA/CBA study results in health care program decisions. It is unrealistic, moreover, to expect that CEA/CBA/, in itself, would be an effective tool for reducing or controlling overall expenditures for medical care." from Summary and Policy Options.

STATISTICAL INFORMATION RESOURCES

Whether you need demographic statistics for activities such as program planning, or for documentation of needs and impact statements in research and funding proposals, the references can be hard to find. Here are some sources of data:

Statistics on Technology for Disabled People

Technology and the Handicapped, Office of Technology Assessment, U.S. Congress, Washington, DC. Analyzes the policies and problems related to current disability statistics.

Use of Special Aids in the United States in 1977, Series 10, Number 135. DHHS Publication No. (PHS) 81-1563. Available from: U.S. Department of Health and Human Services, Office of Health Research, Statistics and Technology, National Center for Health Statistics, Hyattsville, MD, 202/436-8500. October 1980. Statistics on the distribution and use of artificial limbs, braces, crutches, canes or walking sticks, special shoes, wheelchairs, walkers, and other special aids for getting around. Based on data collected in the National Health Interview Survey in 1977.

Statistics About Disabled People

The Physically Impaired Population of the United States. Firing & Associates, 4079C 24th Street, San Francisco, CA 94114. $40.00. 1978. This report presents a statistical breakdown on the handicapped population of the U.S. Both published and unpublished survey data from the U.S. National Center for Health Statistics served as the basic source of figures. The report covers physical conditions only, as opposed to mental. Six major categories are detailed: visual, hearing, speech, paralysis -- partial or complete, absence of extremities, and orthopedic. Each category is broken down further by degree. A unique feature of this report is a description of how the individuals themselves view their characteristics as a limitation of their ability to carry on daily living activities.

In addition and complementary to describing these conditions, several sections are devoted to demographic characteristics of the target population. Noteworthy are statistics on family income, age, use of selected aids, and the costs of rehabilitation programs to the federal government.

Characteristics of the institutionalized population are described separately from those of the noninstitutionalized population. A final section provides information on geographic distribution, including state-by-state breakdowns for all categories and for the total incidence among the working age population.

Spinal Cord Injury Statistics. John S. Youn et al. Available from: Good Samaritan Medical Center, Phoenix, AZ. 152 pages. $25.00 prepaid. 1982. The National Spinal Cord Injury Data Research Center (NSCIDRC), established at Good Samaritan Medical Center in Phoenix, Arizona, has summarized their collection of data on spinal cord injuries in the publication Spinal Cord Statistics. This publication provides a compendium of data describing the demography of the SCI population, the etiology of SCI, medical aspects of SCI management, SCI survival rates, and medical and social outcomes associated with SCI model systems care. As context for this data, Dr. J. Paul Thomas, director of medical and technical programs at the National Institute of Handicapped Research, provides an excellent historical perspective on SCI care.

Regarding technological involvement in SCI, it is noted in a general way, early in the book, that biomedical engineering is developing adaptive interfaces between "spinal man" and his environment. In the section on "Non-Medical Expenditure costs of environmental modification as a function of years following injury and level/extent of impairment. "Environmental modification" is defined to include a major portion of the adaptive equipment which may be prescribed for the SCI patient.

National Survey of Stroke, 1980. The National Head and Spinal Cord Injury Survey, 1980. Available from the National Institutes of Health, Washington, DC. The National Institute of Neurological and Communicative Disorders and Stroke has undertaken a series of surveys aimed at providing valid national statistics on incidence, prevalence, and cost.

The California Disability Survey. J. M. Shanks (UC-B) and H. E. Freeman (UCLA). Available from: California Department of Rehabilitation, 830 K Street Mall, Sacramento, CA. 1980.

Digest of Data on Persons with Disabilities. Prepared under contract to the Congressional Research Service, Library of Congress by Rehab Group, Inc. Available from: U.S. Government Printing Office, Washington, DC 20402. Stock Number 017-090-00050-0. May, 1979.

Labor Force Status and Other Characteristics of Persons with a Work Disability: 1982. U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 127, US Government Printing Office. $4.50. 1983.

Characteristics of Special Populations: Implications for Recreation Participation and Planning. Carol Ann Peterson and Peg Connolly. Hawkins & Associates, Inc., 804 D Street NE, Washington, DC 20002. 1978.

SOME ADDITIONS AND CORRECTIONS FOR THE TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK

FEBRUARY, 1985

ADDRESS CHANGES

RESNA
1101 Connecticut Avenue NW
Suite 700
Washington, DC 20036
202/857-1199

EQUIPMENT FOR THE DISABLED Series
Mary Marlborough Lodge
Nuffield Orthopaedic Centre
Headington
Oxford OX3 7LO
ENGLAND
L8 per book

DISABLED LIVING FOUNDATION
380-384 Harrow Road
London W9 2HU
ENGLAND

INFORMATION SERVICES AND RESOURCES -- DATABASES, CLEARINGHOUSES, NETWORKS

Assistive Device Database System (ADDS) is now solely available from Assistive Device Center, California State University, Sacramento, CA 95819, phone 916/454-6422. Contact person: Helen Woodal, Resource Coordinator.

TECHNOLOGY AT HOME

An Accessible Entrance: Ramps. Design Coalition, Inc., 1201 Williamson Street, Madison WI 53705. 1979. 37 pages. Text and clear graphics presents the basics of ramp evaluation, planning design, construction and materials.

The Idea Machine. Mary O'Donnell, RPT. Little People of America Foundation. 20 pages. $2.00. Available from the author at Johns Hopkins Hospital, Baltimore MD 21206, or from local chapters of Little People of America. A booklet of handy hints for short-statured people. Mainly describes adaptive techniques, and creative use of mass market products, but also includes several DIY equipment ideas.

Making Life More Livable. Irving Dickman. American Foundation for the Blind, 15 West 16th Street, New York NY 10011. 1983. 92 pages. Describes simple, inexpensive adaptations for the home of blind and visually impaired older people. The emphasis is on solutions that can be made by the person him/herself or by a relative, friend, or handy neighbor. The information is very practical, and makes every effort to make do with what is on hand, e.g., a rubber band to identify which bottle is heart medicine.

Resource Guide of Continence Aids and Services. Summer, 1984. 41 pages. $3.00. Available from Help for Incontinent People (HIP), P.O. Box 544, Union SC 29739.

Xandria Collection Catalog: Special Edition for Disabled People. Lawrence Research Group, P.O. Box 31039, Department DP, San Francisco CA 94131. 3rd edition (special) 1983. 35 pages. Free. This discreet catalog of commercially-available sexual aids has a section (pp. 26-28) on homemade adaptations, modifications, etc., for vibrators written for people who find grasping a vibrator difficult.

EDUCATIONAL AND VOCATIONAL TECHNOLOGY

Proceedings of the International Conference on Rural Rehabilitation Technologies. October, 1984. 285 pages. $30 plus $2.54 postage. Available from: ICCRT Headquarters, Box 8103, University Station, Grand Forks ND 58202

RECREATIONAL & LEISURE TECHNOLOGY -- TOYS AND GAMES

USA Toy Library Association
5940 W. Touhy Avenue
Chicago, IL 60648
312/763-7350

CONTROL, COMMUNICATION AND SENSORY AIDS -- SENSORY AIDS

Sensory Aids Technology Update. Annual subscription is now $37/year.

MICROCOMPUTER APPLICATIONS

Microcomputers in the Schools -- Implementation in Special Education. Tom Hanley. SRA Technologies, 901 S. Highland Street, Arlington VA 22204.

Personal Computers and the Disabled. Peter McWilliams. October 1984. 416 pages. $9.95. Quantum Press, Doubleday & Company, Garden City, NY.

FUNDING -- FUNDING

Health Technology Case Study 30: The Market for Wheelchairs -- Innovations and Federal Policy. November 1984. 68 pages. Office of Technology Assessment, US Congress, Washington DC 20510.

Policy Analysis Series Paper No. 22: Improving the Quality of Life for People With Disabilities: Potential Uses of Technology. April 1984. 31 pages. Available from Development Disabilities program, State Planning Agency, 201 Capitol Square Building, 550 Cedar Street, St. Paul MN 55101.

FUNDING -- DO-IT-YOURSELF

Adaptive Equipment: Inexpensive, Custom Designed, Do-It-Yourself. Lenor Davis, Sherrilyn Hawkins, and Laurie Raymond. 1979. 81 pages. No charge. Available from: Educational Service Region, Cook County, 33 West Grand Avenue, Chicago, IL 60610

Patterns and plans for constructing therapy equipment, positioning devices, and other assistive devices from TRI-WALL cardboard.

The Association for the Advancement of Rehabilitation Technology (RESNA), is an organization concerned with the application of science and technology in the rehabilitative process. RESNA brings together a diverse group of individuals with widely varying credentials, activities, and interests who are committed to designing, developing, evaluating, and providing devices that will put the benefits of technology to work for persons with disabilities. Its membership includes rehabilitation professionals, (from all disciplines), providers, and consumers. A goal of the organization is to facilitate the interaction between these groups so they can better meet the needs of those who can benefit from the application of technology in rehabilitation.